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TUBERCULOSIS OF THE BODY OF THE UTERUS, CONFINED TO THE MYOMETRIUM

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TUBERCULOSIS of the female genital organs, not long ago held to be a thing of rare occurrence, is, on the contrary, now known to be fairly frequent. Generally we find the tubes affected, sometimes the ovaries, and often in addition a restricted dissemination under the form of miliary tubercles on the serous coating of the uterus and on the pelvic peritoneum. It has been also proved that many cases of diffuse tuberculous peritonitis originate in the genitals.

Tuberculosis of the uterus, on the other hand, is far rarer, although there have been many cases published in which it appears to be clearly proved. Among these we must distinguish those in which the affection is localized at the neck and those in which the body is attacked.

The former condition the greater number of observers hold to be more rare, and of great importance on account of the questions of pathogenesis connected with it and the possibility of direct infection by way of the vaginal canal; for example, in coitus, as well as the anatomopathological form assumed by them, ulcerative or papillary; also on account of the difficulties in diagnosis they may occasion, especially with malignant tumors. Perhaps some cases are still misunderstood through inexact diagnosis. Tuberculosis of the body is comparatively more frequent and almost always confined to the endometrium. Various anatomopathological forms are described — miliary nodules upon the mucosa, ulcerative, caseous, tuberculous pyometra, generally, as is seen, representing more or less advanced stages of the specific affection; they are almost always secondary to affections of the tubes; sometimes they are apparently primitive and are then explained either by direct infection through coitus, or by metastasis by way of the blood.

It is an exception when the muscular part of the uterus is attacked, and in the few cases reported there has always been a diffusion of tubercles from the endometrium into its depths.

From my researches into the literature of the subject the instances are always of this character.

The following are what I have been able to find:

1. Osiander (Hann. Annalen f. d. gesammte Heilkunde, bd. v, h. 1, 1840, reported by Wassmer, see below) reports a case in which softened tubercles (follicular tubercles: balgtuberkel) in the substance of the uterus constituted an obstacle to discharge. Nine or ten tumors, the size of eggs, with softened centers, were found in the walls of the uterus and others as large as cherry stones projected into the lumen.

Wassmer himself, however, while reporting the case, throws great doubt upon its tubercular character and diagnoses the tumors as myomas softened during pregnancy; particularly as the peritoneum is reported to have been quite free and even in the contiguous parts, with the exception of an ovarian tumor there was nothing pathological.

2. Guzzoni degli Aucarani (Rivista di ostetr. e ginec., 1890) reports a case observed by him at the autopsy of a woman, a virgin, of 40 years, who had previously suffered from peritonitis of which there still remained pleuric, perisplenic, and perihepatic adhesions. On the peritoneum of the posterior face of uterus, particularly in the Douglas sac, little tuberculous nodules appeared, both tubes being enlarged, twisted and containing thick puriform matter. The uterine orifice of the left tube was dilated, and in the corresponding angle of the uterine body a caseous focus was situated in the thickness of the uterine muscle extending for two centimeters (say about an inch), surrounded by a gray zone and normal muscle; there was nothing on the neck nor in the vagina.

Death was due to tuberculous meningitis of the base of recent date. He thinks the earliest affection of the genital organs was the focus in the body of the uterus, from whence the process spread to the tubes. This, however, is not based on any actual data, and seems unlikely, both from the point of frequency and in consideration of what was found in the special case. This is so true that shortly after, the writer himself asserts that in the progress of the old multiple serositis the tubercular virus from the abdominal cavity would have been transmitted through the tube to the corresponding angle of the uterine body.

It is logical to believe that in this case the original localization was in the tubes and spread from the left tube to the uterus.

3. Madlener (Centralbl. f. Gynäk., 1894, p. 529) reports a case of secondary tubercular infection of an adenomatous polypus from an entirely local caseous focus of the myometrium, that was transmitted through adherence to a tuberculous ovarian tumor and was from there distributed.

4. Zahn (Virchow's Archiv., bd. 115, p. 66) reports a similar case of tuberculous infection of a polypus from a tuberculous ulcer of the endometrium.

5. Wassmer (Archiv. f. Gynäk., bd. 57, p. 301, 1899) reports cases of tuberculosis of the uterus observed in the gynecological clinic of Göttingen (Professor Runge). Of these the first five are of the endometrium, with affections of the peritoneum or of the tubes predominating. The sixth case is one of a woman of 39 who had never borne a child, in whom they diagnosed a myoma of the anterior wall, and a cystic tumor of the left ovary. A vaginal hysterectomy was performed. In operating, the bladder was easily separated, but the anterior peritoneum could not be opened; so recourse was had to the fractional ligation of the broad ligaments, and the opening of the Douglas sac. The uterus, however, did not descend and only after the detachment of numerous firm adhesions from the front, frequently with the finger in the muscle of the anterior uterine wall, was it successfully liberated and extirpated, the left ovarian tumor remaining in place. When the uterus was withdrawn there issued from the cavity a grayish-yellow matter. Examination of the extirpated uterus shows the external anterior surface much lacerated and destitute of serous membrane with a nodular tumor seated in the anterior wall and protruding far into the lumen of the uterine cavity, which curved inwards like a sword sheath and was 10 centimeters (4 inches) long; at its thickest point the anterior wall was 6 centimeters (a little more than 2 inches), the posterior wall and the bottom at the thickest point were 2 centimeters (less than an inch). At the section of the anterior wall and the tumefaction the latter appeared full of yellow spots, some round, some long, from which upon pressure exuded in part an oily white mass. The whitish-yellow spots extended as far as the uterine lumen and were not confined only to the anterior wall, but continued beyond the posterior wall, where towards the fundus they filtered into the entire mucous coat and extended even to the myometrium of the fundus at varying depths. Where the mucosa had been preserved it had a grayish-red appearance and presented nothing abnormal microscopically.

The microscope showed that the whitish-yellow portions corresponded with necrotic portions of caseous appearance, and contained many giant cells, but no circumscribed tubercle; amongst these necrotic masses there were scattered larger and smaller islets of muscle, of isolated glandular forms in transverse section, for the most part with parvicellular infiltration. In place of the mucosa there was a layer of granulated tissue with abundant vessels, containing very few tubercles and few giant cells. Only in the posterior wall were some remains of preserved mucosa apparent, with glandules that penetrated into the muscle resulting in active growth of epithelia, isolated mitoses and considerable leucocytic inward migration. The interglandular tissue was infiltrated with small cells and showed isolated giant cells. The muscle of the posterior wall showed only parvicellular infiltrations along the vessels. Search for tuberculous bacillus gave positive result

Wassmer, in illustrating this case, says that, more than a tuberculous process having begun in the uterine mucosa the entire finding indicates a diffuse infection from peritoneal tuberculosis, with tumor-like production in the anterior wall of the uterus from which later the process spread to the endometrium and posterior wall.

6. Gottschalk of Berlin, in discussing the communications on Tuberculosis of the Genitals, at the International Congress of Obstetrics and Gynecology held in Rome in 1902, cited a case of a virgin of 32 years, upon whom a total vaginal hysterectomy was performed, where tuberculous lesions of the tubes and endometrium were found with a circumscribed tubercular focus, clearly intramuscular, separated from the mucosa by a tract of healthy muscle. He said that this proved that tuberculosis can localize itself even in the thickness of the uterine wall by way of the lymphatics.

7. Popow (Russki Wratsch., 1906, n. 12 and 13, reported in Zbl. f. Gyn., n. 33, 1907) that in a multipara aged 39, who exhibited an ulceration of the neck, he diagnosed by partial excision and microscopical examination tubercular infection and performed vaginal hysterectomy.

Besides the ulceration of the cervix there was a tuberculous focus of 7 cm. (say 1-10 of a square inch)

Fig. 1.

Fig. 2.

in the anterior wall of the uterine body near the left angle.

8. Simonds (Ueber tuberkulose des weiblichen Genetalapparatus, Arch. f. Gyn., 1909, bd. 81, hft. 1, p. 29) prosector of the Hospital of S. George, Hamburg, reports eighty cases of genital tuberculosis, in fifty-two of which (sixty-five per cent) the tubes and uterus were affected, while in only nine (eleven per cent) was the uterus alone affected.

The nine cases of uterine tuberculosis were all endometritic, in some there was diffusion into the myometrium, always by the lymphatic vessels. With a series of sections the writer affirms he can demonstrate that no isolated nodules exist in the muscle, but they are dependent upon tuberculous lymphangitis.

9. Fromme (of Halle) at the meeting of the German Society of Obstetrics and Gynecology held at Leipzig on April 26th, 1909 (reported in Zbl. f. Gyn., n. 81, 1909, p. 1093) speaks of a vaginal hysterectomy performed on a woman of 41 years of age who had been many times scraped on account of recurrent hæmorrhage. The tubes had been reduced to two purulent sacs, the size of pigeon's eggs; on the uterine mucosa could be seen, even microscopically, small tubercles; in the muscle near the endometrium under microscopic examination tubercles also appeared. The writer thinks the hemotogenous origin of this tuberculosis indubitable; the apex of the right lung was also affected.

It is seen then, in all these cases, that with the uterine affection there was also tuberculosis of the tubes, or at any rate the uterine muscle had been attacked, together with and evidently secondarily to the endometrium. The only case of tuberculosis limited to the muscle I have been able to find is that produced by Watkins at the meeting of the Chicago Gynecological Society, May 17, 1907, reported in SURGERY, GYNECOLOGY AND OBSTETRICS, vol. 5, 1907, p. 603, but the case is by no means certain. He presented the specimen, from which it appeared there was a tubercular affection of the muscle and not of the endometrium, which, said the speaker, would indicate that it was secondary to tubercular affection of other organs, although the history and the examination of the patient indicated nothing specific. The menstrual history was important, during the last years menstruation had been very irregular. It continued until the patient was fifty-five years of age. She then remained for two years quiescent, and again for three years after suffered abundant loss of blood.

Probable cancer was diagnosed and hysterectomy performed.

He says there was also a tumor of considerable size at the urinary meatus, supposed to be cancerous: it was about half an inch in diameter. Sections of this tumor showed that it was an adenoma with cells of a single layer

Fig. 3.

Fig. 4.

everywhere, without any tuberculosis being found.

There was a thickening of the epithelium of the endometrium that suggested an adenoma. Professor Zeit was uncertain whether it was malignant or not; it was certain that the tuberculous affection was confined to the muscle. It appears, then, there is reason to doubt the accuracy of the observation. If the figure of the diseased uterus shown on page 604 be examined, it would seem to indicate a papillary tumor of the endometrium; also as reported in the discussion, Lewis expresses the opinion that it was a "semi-malignant" (?) adenoma, and the tumor of the meatus a metastasis. He adds, "that there is also tuberculosis, is probably true: under the microscope, giant cells can be distinctly seen in the muscle of the uterus." And that is all!

The more important has it seemed to me to communicate the case observed and operated by me, since the affection is certainly tubercular, limited to the myometrium and originating there:

Here is a summary of the clinical history:

Maria C., aged 43, of Pescara (chieti), married, living at home, entered my division of the Policlinico Umberto I, April 3, 1910.

The father died of pulmonitis two months ago; the mother was living and healthy. No hereditary tuberculosis or arthritis.

Patient had almost always enjoyed good health; at the age of 26 she suffered from malarial fever, lasting about a month and never recurring. She married at 21 and was never pregnant. The husband died, it seems, of pleuritis (?). Eight years ago she remarried a healthy man; no children by this second union.

Menstruation began when she was fourteen, and she gave the assurance that it has always been regular both as to time and quantity until quite recently. Five months ago she fell from a stair injuring the left side of the abdomen in front near the anterior superior iliac spine. She suffered acute pain, which was reduced by rest and linseed plasters; but upon getting up again, she suffered fresh pain in the epigastrium and both inguinal regions with gradual increase of intensity; besides this, in the last three months menstruation had become irregular with loss of blood in small quantities two or three times every month; in the intervals there was a scanty secretion of vaginal mucus; now for twenty days she has had metrorrhagia. She has never known difficulty in micturition, nor observed alteration in the quality of the urine emitted.

The intestine, habitually costive, has become still more torpid recently. For a month the pain from the lower quadrant of the abdomen has at times radiated along the anterior region of the right thigh. She has never been feverish. She has become noticeably thinner, and markedly reduced in strength; appetite preserved; digestion good.

Objective examination. No result from the inspection of the abdomen. Palpation causes pain in the lower half below the umbilical transversity with greatest intensity along the middle line. Deeper palpation makes apparent the presence of a swelling in the median

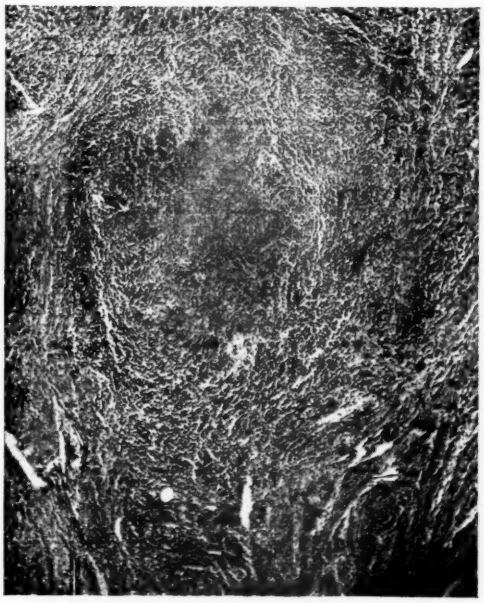

Fig. 5.

Fig. 6.

line, globular and hard, about three fingers across above the symphysis pubis, and extending laterally nearly to the external margins of the recti, losing itself behind the pubes.

Exploration of the vagina showed the external genitals healthy, vagina narrow and deep; the neck of the uterus had been carried backwards with its axis almost perpendicular to that of the vagina; it was conical with a small round orifice; the posterior fornix appeared free, the anterior had almost disappeared owing to the presence of a tumefaction partly occupying the lateral fornices in their anterior half. On palpating with both hands, the body of the uterus was found considerably bent forward; it was mobile. At the bottom and in front it appeared globular on account of the above-mentioned swelling about the size of a mandarin orange, hard and fibrous, with smooth surface and not very painful. The adnexæ were difficult to palpate and appeared normal. Hysterometry revealed a hollow of 9 centimeters with anterior curve but less marked than appeared on exploration, because of the presence of the already mentioned globular mass on the anterior wall towards the bottom. Nothing abnormal was found anywhere in the rest of the organism; some little fusiform lymphatic ganglia, not painful, were in the inguinal regions. Heart and lungs sound. Urine normal in quantity and quality.

Diagnosed fibromyoma of the anterior wall, and operation decided upon.

This was performed on April 6, 1910. Spinal anæsthesia was previously administered with 4 centigrams of stovaine, and 2 of novocain, which had to be followed by the administration of small quantities of Schleich's No. 3 inhalation liquid. Middle subumbilical laparotomy. The uterus was found deformed and globular at the higher part of the anterior wall. Subtotal hysterectomy, leaving a little stump of the neck. Hæmostasis: peritonealization of the pelvic plain.

Suture per primam.

Progress after operation quite normal. Stitches removed the eighth day.

The patient left the hospital on the 4th May quite cured.

Returned to show herself at the end of June; she was in excellent condition.

The part removed, which after extirpation was believed to be a myomatous uterus, consists of the uteurs, minus a portion of the neck, the two tubes and the ovaries.

The uterus was almost twice normal size: its external configuration deformed by a swelling (see Fig. 1) on the anterior face of the body on account of which the upper portion of its face projected very far forward and formed a rounded angle with the part below. We had the characteristic aspect frequently observed in intramural fibroma, which can be divined from outside on account of the deviation of form and volume its presence makes in the uterine wall.

The serous coating of the uterus was normal. The ovaries presented no details worthy of remark. The tubes were a little arched each towards the other, both openings tending to be brought towards the middle

line of the posterior wall. Some cysts varying in size from that of a chick pea to that of a filbert nut, with thin walls and containing limpid serum were noticeable on the external surface of the salpinges. On cutting into the uterus and dividing the anterior wall in half as far as the hollow of the uterus this proved to be of abnormal amplitude; the endometrium showed no alteration. On the surface of the section, in the thickness of the wall, appeared the above-described nodus, as large as a crownpiece, consisting of yellowish matter (see Fig. 2), friable, moist, and of thoroughly caseous appearance; the nodus was surrounded by bands very evidently of muscular tissue, separating it from the serous and mucous layers, which were apparently normal. There was no true capsule surrounding the focus recognized.

Microscopic examination. The tubes with the lumen were shown to be unaffected when examined macroscopically and also quite normal when examined under the microscope (see Fig. 3).

Preparations of the above mentioned focus showed that it consisted of a united mass of confluent tubercles some of which exhibited the typical structure of the Koch's bacillus granuloma (see Fig. 4); while principally showing an advanced and extended caseous necrosis (see Fig. 5). The tuberculous process reached the endometrium of the body; some dilated glands with scaly epithelii appeared surrounded by parvicellular infiltration here and there in the form of lymphoid masses; at times evidently young typical tubercles appeared; the mucous layer nowhere showed ulceration or destruction (see Fig. 6).

In the lower portion of the body, also appeared scattered in the uterine muscle, very young typical miliary tubercles. Also towards the endometrium here and there among the deep glands were some isolated lymphoid nodi. Although preparations were repeatedly colored there was no success in proving the presence of any Koch's bacillus in the sections.

However, there is no question as to the tuberculous nature of the process considering both the characteristics of the granuloma, and the positive result obtained on intraperitoneal innoculation of a guinea pig with a fragment of the caseous mass. Besides on the fourth day after operation an epidermal reaction on the arm was essayed, which after twenty-four hours gave doubtful, and after thirty-six hours positive result.

The case is without any doubt one of tuberculosis of the uterus, originally of the myometrium. That there was no affection of the ovaries, the tubes, the serous membrane, nor of the endometrium on the surface, excludes the primary localization in them as is the usual case. On the other hand, the extension of tuberculous alterations in the muscle of the anterior wall towards the fundus in the form of a great caseous gumma surrounded on all sides by bands of muscles, and the diffuse caseous necrosis of the focus serve to demonstrate the original seat of the process, while the miliary tubercles scattered in the neighboring muscle and towards the mucous coat evidently indicate a more recent diffusion.

The localization in the myometrium must certainly have come by way of the blood-vessels, and probably is secondary to another focus in the organism, of which, however, clinically there was no trace; but we know that it may exist if only in one or a few peribronchial or mesenteric ganglia without any actual symptomatic manifestation.

THROMBOSIS OF PELVIC VEINS FOLLOWING SEPTIC ABORTION

EXTIRPATION — RECOVERY

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IT seems as though we were gradually reaching a stage where the surgical treatment of puerperal sepsis in its different forms is ready to assume the all-important place which it deserves. v. Herff in his summing up at the last international congress at Budapest practically admitted that there is no such thing as a curative internal therapy. The main difficulty, as far as surgical interference is concerned, remains even to-day the exact definition of the indications in a given case.[1] But these difficulties are being rapidly overcome, and for certain forms of puerperal infections we already see our way clear to-day if we follow such experts as Bumm and Latzko, who teach us to come to a definite understand-

[1] Cf. Vineberg, SURGERY, GYNECOLOGY AND OBSTETRICS, vol. ii, p. 30.

ing as to localization and character of the infection in at least certain classes of cases.

On April 14, 1910, J. G. was admitted to my service at the German Hospital of the city of New York. The patient, a well developed woman of twenty-six years, had been pregnant four months and had miscarried a few days before entering the hospital. On the day of admission she had a severe chill in the afternoon, pulse between 100–110, temperature 105°. The uterus was promptly emptied in narcosis by the house surgeon; remnants of the placenta were removed. The next four days' temperature remained comparatively normal, not exceeding 101° in the evening; no hæmorrhage, no chills. On the fifth day, however, severe chill, temperature 105°, pulse 110, cold sweat, prostration; blood culture (Vena med.) sterile. Patient was carefully observed and examined repeatedly during the next four days. There was no local tenderness. Uterus rather soft, large; adnexa, which could be well palpated, normal, both broad ligaments were pronounced free. (Bacterial examination of lochia was omitted.) Patient made a very grave impression. Quality of pulse bad, cold sweats, severe prostration, one or two long severe chills followed by temperature up to 105° F. every day. On April 24th bimanual examination revealed a distinctly palpable mass corresponding to right broad ligament, extending from right side of uterus towards pelvic wall. Left broad ligament absolutely free. The diagnosis of septic thrombosis of uterine veins on right side was made and immediate operation decided upon.

Here, then, we had a case where the indication for surgical interference could be founded upon the following cardinal facts:

1. Undoubted intrauterine infection.
2. Typical temperature curve with deep remissions.
3. Corresponding pulse.
4. Chills.
5. Palpable mass in broad ligament.
6. General impression that of a very grave infection with a bad prognosis.

Operation: Longitudinal incision. Upon opening the abdomen the diagnosis was found to be correct in every particular. Uterus orange size, soft, doughy. Left adnexa and left broad ligament entirely normal. On right side beginning at and in direct continuation with the uterine veins in broad ligament distended and filled with solid thrombi, the entire sausage-shaped bundle about 3 centimeters in diameter. The mass extended laterally to pelvic wall. Broad ligament clamped at uterine edge. Then I endeavored to find the distal end of thrombi, but found that they extended beyond innominate line and that a solid thrombotic mass filled the hypogastric and internal iliac veins. Therefore the abdominal incision was enlarged up to processus xyphoideus, and now the palpating finger could ascertain that the thrombus also filled the common iliac, almost to its point of union with the left common iliac. There was only one thing to do and that was to try and dissect out the entire thrombosed tract *in continuo*. The peritoneum was incised longitudinally over the thrombosed vessels and held aside with artery clamps, the thrombosed right iliac ligated with silk ligature just under its point of union with the other common iliac; at this point the vein seemed to be empty, and then the entire tract, beginning at uterine border was dissected out. This was technically much easier than I had anticipated. There was very little œdema in the surrounding tissue, and the thick thrombus had made the veins so plastic that with care it was comparatively easy to extirpate the entire tract without lesion to surrounding tissues. The upper end of common iliac under the ligature was burned through with paquelin and the peritoneum sewn together with continuous catgut suture. The question now arose whether or not to remove the uterus. The cavum, it is true, had been cleaned thoroughly by an experienced and very skillful house surgeon, but in spite of that there might have been particles of infectious material in the cavum, and the uterine wall itself on the side of the thrombosis surely was infected. I therefore quickly removed the soft uterus. Panhysterectomy. Bladder peritoneum sewn to anterior vagina, posterior peritoneum to posterior vaginal wall. Sterile gauze into wide open vagina. Closure of abdominal incision.

I am indebted to Dr. F. Sondern for the examination and preservation of the specimen, which represents the uterus with left adnexa and the entire tract of thrombosed veins on right side *in continuo*. The specimen (see Fig. 1) was presented to the Section on Obstetrics and Gynecology of the New York Academy of Medicine at its May meeting. Microscopical examination of sections of uterine wall and also of sections through thrombotic mass from within the vein (Gram) showed no stainable streptococci. I believe,

Fig. 1. A, Thrombosed plexus. B, Normal left appendages.

however, that a more extensive examination may still give a positive result.

The immediate result of the operation was very satisfactory. Patient rallied very well. Temperature remained moderate for three days, no chills. On fourth day, however, renewed chill; temperature again rose to about 105° F. and now followed a period of two weeks, during which time patient had daily chills, sometimes two, high temperatures followed by deep remissions, cold sweats. Repeated blood tests were made, but cultures always sterile. After May 13th temperature remained normal. Complete recovery. Patient left hospital on June 11th. I wish to state the astonishing fact that at no time could disturbances of circulation on the side of operation be noted.

On May 11th and after patient was given injections of streptococcus vaccine (Mulford) in doses of one vial daily, until May 19th. She had no more chills after the first injection and the temperature came down within the next three days to remain normal.

It remains an open question whether this was a coincidence or whether the vaccine indeed came to the aid of the constitution in vanquishing an already subsiding enemy. I can omit to discuss this question at the present moment, because I publish the case for other reasons. In the first place this is the first case as far as I can see[1] of extirpation of thrombosed pelvic veins including common iliac followed by recovery; in the second place, and this is the main reason, because it illustrates the possibility of making exact indications for operative interference in certain cases of puerperal infection, in particular in those which are characterized by propagation of infectious material through the venous system: thrombotic streptococcic pyemia.

[1] Cf. F. Fromme, "Die Venenunterbindung bei chronischer Streptococcensepsis," Praktische Ergebnisse der Geburtshilfe und Gynaekologie, vol. i, p. 355.

TUMORS AND RETENTION CYSTS OF THE APPENDIX

By HUGH CROUSE, M. D., El Paso, Texas

THIS subject as yet has no place in clinical medicine due to the lack of pre-operative or pre-post-mortem history. A careful review of the cases recorded in the appended index, of benign and malignant growths of the appendix, shows no record of a correct diagnosis having been made previous to operative interference or autopsy. The major portion of the articles reviewed show a remarkable number of patients reciting a history of chronic appendicitis; quite a number gave no history of appendical trouble, and growths were only discovered upon examination of the appendix while performing some other operation, particularly in women while operating for some pelvic derangement. The number of abdominal operations being done upon women in all clinics to-day, in contradistinction to men, no doubt explains the greater proportion of primary growths found in the appendices of women over men. Practically all of the reported cases discovered in male subjects and children were patients being operated upon for chronic appendicitis; were autopsy cases in which tumors of the appendix are found carefully investigated, the foregoing, I believe, would prove to be correct.

Benign growths of the appendix vermiformis run the gamut of polypi, 4 cases; myoma, 1; fibromyoma, 4; myoma, 1; cysts, 256; granting that Van Hook's report (see index) does not cover other cases, or that Baillet's case from literature is not a report of a previously enumerated specimen. Ribbert found 6 cases in 400 autopsies, a proportion of 1.5 per cent to posts made; Steiner, 3 cases in 2,286 autopsies, a proportion of 13-100 of 1 per cent; Booay, 1 case in 528 posts, 18-100 of 1 per cent; Boston City Hospital reports 16 in 3,700 autopsies, a proportion of .43 per cent. One hundred of these 256 cases were found as contents of hernial sacs; 4 were found during other operations or through tumor symptoms in appendical regions, inducing operative intervention. The remaining 152 cases were found during posts, showing that cysts of the appendix induce but few symptoms. The classification of retention cysts with tumors of the appendix is done with the idea of exhausting the subject of growths, benign or malignant, of the appendix.

The etiology of cyst formation is, no doubt, explainable on the basis of pyogenic change in the appendical mucosa, subsequent to stricture formation in a chronically inflamed or ulcerated appendix, which has obliterated the lumen, by cicatricial healing processes. Many malignant specimens show cystic change in the tip where the central or proximal central area of the appendix is malignantly involved.

The classification as malignant of the major portion of cases denominated primary carcinomas of the appendix vermiformis under the heading of basil celled or spheroidal celled carcinomas, appears to me almost an anomaly. The well known indefiniteness of the average histological report of specimens submitted to the pathologist, coupled with the age incidence of the spheroidal type of cases, lack of lymphatic involvement, absence of metastasis, rare recurrence, and a history of the simple removal of the appendix curing the case, lead one who carefully studies the reports available in current literature, of primary malignant growths of the appendix, to doubt the authenticity of many so-called malignant cases. I do not mean to refute, simply to inquire: If a case report were given you, recited as a malignant involvement of the intestinal tract, which gave no metastasis, no lymphatic involvement, and no recurrence, occurring in a youthful individual, many times manifesting no symptoms, would you classify it as malignant? After weighing these points, together with the rarity of malignant growths in the intestinal tract from pylorus to anus, as compared with the frequency of chronic inflammation, could you acquiesce readily in such a conclusion? Would you simply add to the testimony refuting a hurried decision: the close similarity, microscopically, of imperfect tissue repair and basil cell changes, in opposition to the appear-

ance and results of colloid, scirrhus, and columnar celled growths, when they appear within other portions of the intestinal tract, their well known age incidence above 35, their metastatic involvement, lymphatic extension, and almost positive recurrence, necessarily compel hesitation. It is passing strange that a structure such as the appendix vermiformis, differing in no sense physiologically, histologically, or anatomically speaking, from its immediate attached intestinal area, should be so peculiarly liable to, and so queerly resistant to, malignant changes. Why should a structure like the appendix, when once malignantly assailed, resist the encroachment of a destructive growth, as it doubtless must, if reports of such involvement are histologically correct? Is it nerve, lymphatic, or blood supply, anatomically or physiologically different from the caput coli? If not, then why should it alone possess a resistant force that the remainder of the intestinal tract does not inherit? Is it not highly susceptible to acute inflammation, with a tendency to become chronic, far in excess of its similar adjacent structures? Is not long continued irritation accepted as one of the chief causes of malignant involvement? Sippey, in an editorial comment, in SURGERY, GYNECOLOGY AND OBSTETRICS, October, 1908, on Rollston's and Jones's article on primary carcinoma of the appendix vermiformis, also makes inquiry regarding these points, using their article consisting of 63 cases in literature, from which number they exclude 21, there being inadequate proof of malignancy. The essence of their article is briefly as follows.

Of the 42 accepted cases, 33 were operated upon, no suspicion of the true nature of case existing before operation; average age, 30.8; sex equal; operation needed, rarely exceeding simple removal of the appendix; the immediate and remote results of operation surprisingly good. The 42 cases were of the following types: Endothelioma, 3; sarcoma, 2; carcinoma, 37; of the 37, 17 were of the spheroidal cell type; average age incidence of the latter, 27.2 years; no lymphatic involvement or metastasis. Of the 37 cases, 5 were the columnar cell type, the true adenocarcinoma, the form usually encountered in the alimentary canal between the cardia and anus; age incidence average, 52 years. Rollston and Jones summarize as follows:

1. This disease is one in which an accurate pre-operative diagnosis is impossible; in every case symptoms imitated appendicitis in some form.

2. 80.9 per cent of authentic cases have been reported since 1900, showing that malignant involvement of the appendix is not rare.

3. Pathologically, several varieties of carcinoma have been reported, the majority of them being the spheroidal cell type, which are peculiar in their early age incidence, their slight malignancy, and resemblance to endothelioma, colloid changes not common.

4. Presence of concretions mentioned in three cases out of the entire accepted 42. Inflammatory changes, either acute or chronic, very frequently accompany the growth.

5. That immediate and future prognosis is good after operation, particularly in the spheroidal type.

Harte divides malignant involvement of the appendix into two types: The so-called basil or spheroidal cell type and the columnar. The former occurs in young, the latter in old subjects; only method of diagnosis is operation or autopsy, and microscopical examination of growth. These growths are engrafted upon an appendix that is chronically inflamed; it occurs in the mucosa and submucosa; that the first type occurs between 10 and 40 years of age; the second between 40 and 60; that the first has practically no tendency to recur; that the second has a marked tendency to metastasis and recurrence; that the first type closely resembles carcinoma of the skin, the basil cell skin growth of Krompecher.

Harte further states that primary carcinoma of the appendix is present in from one-third of 1 per cent of all cases operated upon for chronic appendicitis, and that a much larger percentage would be found were routine microscopical examinations made of all specimens removed at operation or autopsy.

Le Conte comments upon the fact that the simple removal of the appendix is sufficient to bring about a cure.

M. Lutulle reports that the tumors found were not large, rarely exceeding the size of a cherry, consistency hard, color white. He

classifies them into two types, cylindrical cellular epithelioma, and a more or less typical carcinoma. He comments on the comparatively benign nature of the first type.

Jessup reports one case, and reviews 12 in literature, which were indubitable cases; two of the cases were under 20, four under 30 years.

Cullingworth and Coarner comment upon the fact that in about one-half the cases the tumor is found at the distal end of the appendix, and that the growth is a small, hard, whitish nodule; that most of the subjects are young and prospects of cure are good, and state that either the growth sloughs or the patient dies from appendicitis, or the organ is removed before dissemination has occurred.

McWilliams, in a review of 90 cases, with an appended note of 15 more, personal and in literature, summarizes as follows: He claims that carcinoma of the appendix should be placed in a distinct class, so far as malignancy is concerned, in contradistinction to malignant growths of the alimentary tract generally. He claims that concretions have not discoverable factoral importance in this form of cancer; says the disease develops most frequently at the site of strictures, obliterations of the tip, and chronic inflammatory lesions; that enlarged lymphatic glands were present in nine per cent of his cases; that primary cancer of the appendix occurs in four-tenths of one per cent of appendices operated upon; types, columnar, 22 per cent; spheroidal, 53 per cent; transitional, nine per cent, and colloid, four per cent. Secondary growths were found in 6.6 per cent of the cases. From which he infers that at present one cannot say whether cancer is primary or secondary to coincidental chronic inflammatory lesions.

Out of the 90 cases, 76 were operated upon; 63, being 83 per cent, suffered from appendicitis. Of these 23, or 36 per cent, were operated upon during or immediately after their first acute attack; while 40, or 63 per cent, had had symptoms of chronic appendicitis. In 78 cases in which ages are recorded, 47, or 60 per cent, were under 30 years, corresponding very closely with the age incidence of inflammatory appendicitis. In 77 cases where sex is mentioned, 44, or 57 per cent were in females; 33, or 42 per cent in males; concretions in the 90 cases only existed in five cases or 5.5 per cent. In 91 cases, in which the situation of tumor was mentioned, the location of growth was at or near the tip; in 46 per cent at or distal to the middle.

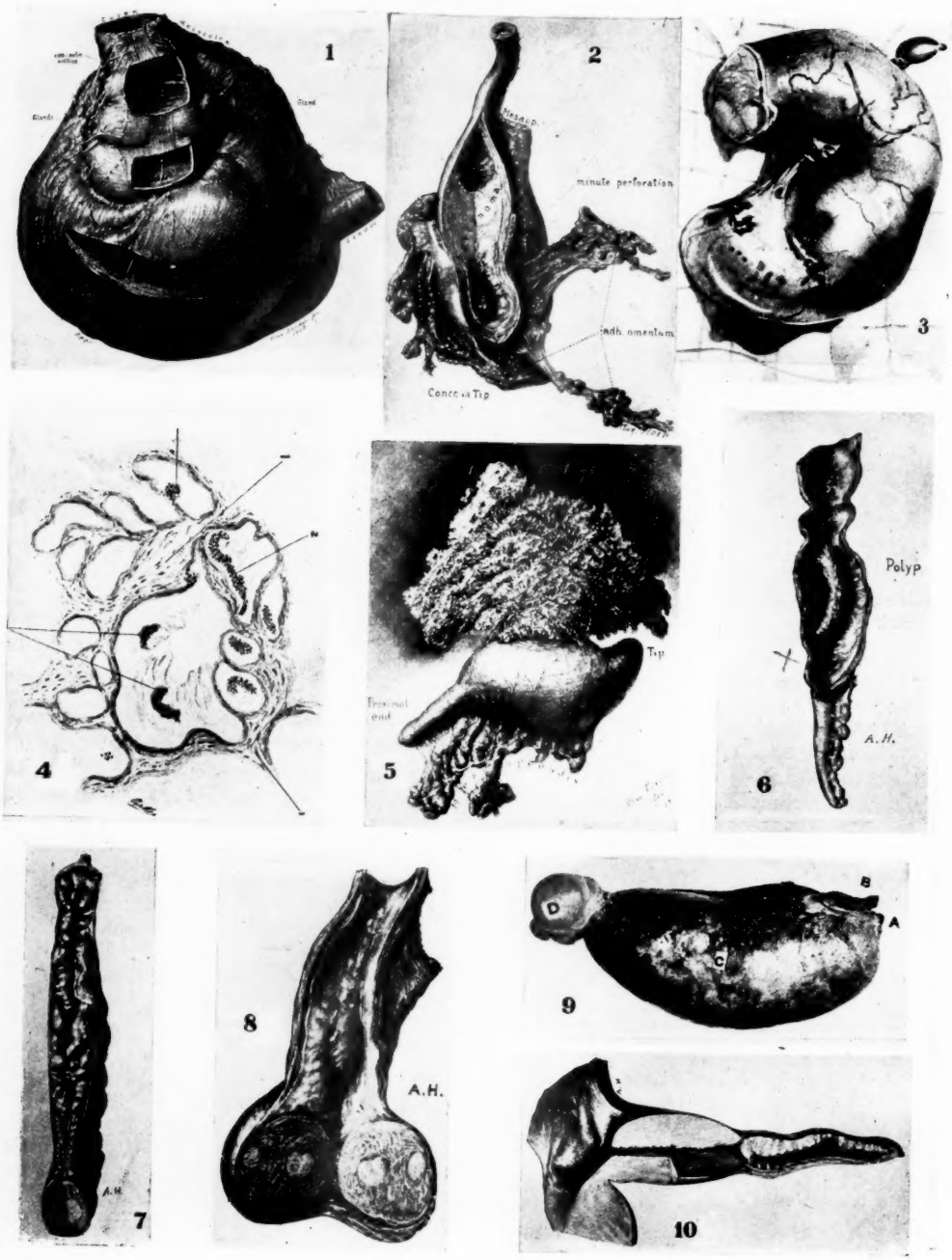
Elting comments particularly upon the tendency of carcinoma of the appendix to develop at a comparatively early period of life; also its lack of liability to extension or metastasis.

Moschowitz speaks of the greater number of malignant appendical growths occurring in the female, rather than in the male, his findings being 3 to 1.

Zaaijer reports 5 cases of primary carcinoma of the appendix, which he observed personally and mentions 55 others which he found in literature. He comments upon the preceding existence of chronic appendicitis as an important factor in the etiology of cancer of this organ; also another striking feature being the youth of the patient, being between 1 and 10 years in one case; between 10 and 20 in seven cases; between 20 and 30 in twenty-two cases; between 30 and 40 in fifteen cases; in the remaining 6 cases of his report, it occurred in patients between 40 and 90. Continuing, he states, that very small carcinomas are found in the appendix 10 to 30 years earlier than the large cancerous tumors found in the intestines, exhibiting distinct clinical manifestations. In 25 cases the history of the patients had been followed since removal of the cancerous appendices. Four are known to have been in good health for five years or more; three for three years; four for two or three years, and the others for one or two years. In only three instances was recurrence observed, out of the total 52 cases. Where the sex was known, only 18, or 32.6 per cent were in men.

Volskler reports two typical primary carcinomas of the appendix, that came under his observation, and reviews 78 in literature. He comments on the fact that in no other point in the body does cancer make its presence known so early. The inflammatory reaction on the part of the appendix leads to operation while the lesion is still in its incipiency, which, in his opinion, explains the reason for the good prognosis.

Wells, in his paper, comments upon the youth



(See legends on opposite page.)

of the cases, and states that he was able to find only one case which had died of carcinoma, existing only at the appendix. He also mentions that he found only one case in all those that had been reported that had died of metastasis, and states that it was not a bona fide case, as there also existed a carcinoma of the ovary. In summarizing, he questions whether the malignancy or benignancy of the tumor is due to an inherited resistance on the part of the tissues of this region, or whether something else acts as a resistant force, and he leaves this point a still mooted question. Perhaps early symptoms and early operation explain this resistance.

H. Kelly, in commenting upon the review of cases, speaks of the fact of their bearing a striking resemblance to the basil cell carcinoma of the skin, described by Krompecher.

The foregoing scanning of the leading articles summarized in the attached index, simply confirms the statements made in the first part of this paper, viz., that the major number of cases of primary carcinoma of the appendix are of the spheroidal type; that this type is notoriously benign, and, oddly, attacks the young, thus seemingly refuting the belief that carcinoma is a disease only attacking those of middle age or past middle age. Many reporters explain this on the basis of early removal of the offending appendix, and assert that should such operative procedure not be adopted, the usual history of extension would occur.

In support of the statement that a basil cell growth is macroscopically and microscopically difficult to separate from an imperfect tissue repair specimen, I desire to report the following case, and call your attention to photo of specimen and camera lucida illustrations made by Pathologist F. J. Hall, of Kansas City, from my specimen of hyperplasia.

M. C., American, age 23, was referred to me by his family physician, Dr. McGinnis, of Casas Grandes, Chih., Mexico, with a note giving the following history: Patient ill with seemingly acute attack of appendicitis, lasting two weeks; no previous attack; treatment, Ochsner's method. My examination of patient showed apparently normal heart, lungs, and kidneys; mass occupying the major portion of triangle, of which umbilicus served as apex, and line from right kidney area to close to middle of right Poupart's ligament as base; pains in right leg, unable to stand erect; constipated; patient stooped and bent to right side in walking; temperature, 100.2°; pulse, 96; tongue coated. Diagnosed, appendical abscess, well walled off. Advised operation. Operated subsequent day. On opening abdomen was surprised to find instead of pus a mass consisting of large area of omentum, ileocæcal area of large and small bowel. Appendix incorporated in growth. Condition deemed to be one of probable sarcoma of appendix, after weighing age of patient and rapidity of development of tumor. Resected 6 inches of ileum, 3 inches of cæcum, and wide area of omentum, and end-to-end anastomosis between large and small bowel. Patient made a perfect recovery. Sections of growth showed same to be a simple hyperplastic structure or imperfect tissue repair.

DESCRIPTION OF CHRONIC HYPERPLASTIC APPENDICITIS

This specimen presents in the gross the following features: The surgically removed mass presents four inches of the gut at the ileocæcal valve, to which is attached by an isthmus one inch in length a roughly cylindrical mass of indurated fat from the omentum, the latter mass lying parallel to the axis of the gut forming a mass with the intestine roughly resembling the letter H.

The intestine and indurated fat mass is covered with a small amount of shaggy exudate presenting areas of considerable extent that are very red from great numbers of new formed and distended blood-vessels.

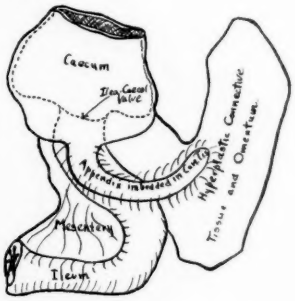
Incision into the cross member or isthmus reveals an appendix tightly enveloped in fully developed connective tissue. The mass of fat is likewise rendered exceedingly hard by the infiltration into it of much new formed connective tissue of sufficient age as to be composed of much white fibrous tissue encircling and invading the fat areas, the cut surface presenting the small circular and oval areas of yellow fat separated by firm glistening connective tissue, the entire fat tissue being so hardened by the fibroblastic tissue that one would think that cancer or tubercle might be present.

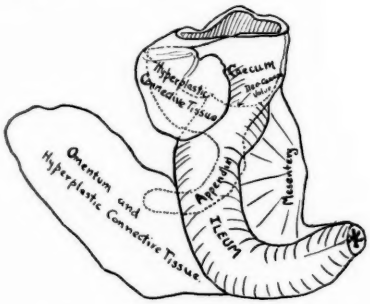
Microscopic section made through the appendix and its enveloping tissue presents a more or less normal

1. Fibroma of the appendix and appendico-cæcal.
2. W. S. Halsted's case of carcinoma of the appendix. Kelly's text.
3. Carcinoma of the appendix. Watkin's case.
4. Carcinoma of appendix. (1) Fibrous tissue framework. (2) Epithelial cells in state of mucoid degeneration. (3) Epithelial cells. Watkin's case. April, 1909.
5. Colloid carcinoma of the appendix discovered at autopsy. Etting's case. Kelly's text.
6. Oviatt's case of polyp in the appendix. Kelly's text.
7. McBurney's case of primary carcinoma of the tip of the appendix. Kelly's text.
8. McBurney's case. Primary carcinoma. Limited to lip. Remainder of appendix normal.
9. Wood's case. Cystic appendix.
10. Bernays' cases of sarcoma of the appendix involving the adjacent portion of the cæcum.

Fig. 11. Hyperplastic periappendicitis, posterior view. See line drawing.

Fig. 12. Hyperplastic periappendicitis, front view. See line drawing.





set of mucous glands lined with perfect epithelium. There is a small amount of polymorphonuclear exudate in the appendicular lumen. A simple catarrhal process. The submucosa is greatly thickened by hyaline and swollen bundles of white fibrous tissue. The quantity of lymphoid tissue in the mucosa is notably reduced by the surrounding hyperplasia of connective tissue.

Here and there are thin walled, newly formed blood-vessels that have ruptured and liberated a varying amount of blood into the tissue. Below the submucosa we encounter the muscular walls of the appendix and find them the seat of a marked new formation of connective tissue. Here each supply vessel is enveloped by a sheath of connective tissue far in excess of the normal. The individual muscle fibers are separated by strands of white fibrous tissue and present also a liberal sprinkling of polymorphonuclear leucocytes and a very notable number of eosinophile leucocytes.

The serosa is converted into a thick layer of hyaline structureless material showing in its substance many new formed thin walled capillaries that are for the most part widely distended with blood showing a distinct excess of leucocytes. There is much effused blood in the serosa. The peritoneal endothelium is absent.

The thickened mass of omentum shows a typical indurative inflammatory process in which the productive process is replacing the fat tissue by fibrous tissue. There is no evidence here of any specific infective agent such as tubercle bacilli, as there are no notable signs of tubercles or of giant cells.

TUBERCULAR APPENDIX SPECIMEN

This specimen is an irregular piece of tissue encompassing a piece of intestinal mucosa and a segment of appendix.

Section cut through the entire mass shows on one surface the structures of the colon. Adjacent to this and involved in the same broad mass of inflammatory tissue is a cross section of an appendix. In the submucosa of the appendix are a number of typical tubercles containing the classical giant cells. This picture is so well known that description further is superflous.

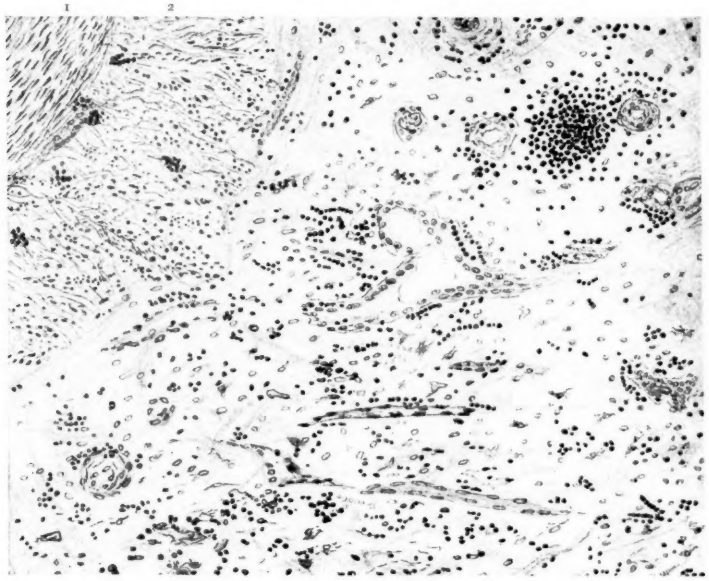


Fig. 13. Hyperplastic periappendicitis. 1, External muscular layer. 2, Internal muscular layer. 3, Hyperplastic connective tissue, new blood-vessels, chronic inflammation. (Camera lucida, Leitz 3/3 objective.)

In speaking of this case to surgical colleagues, they report similar cases, in which during operation they were confronted with seemingly inoperable malignant involvements of the appendical area. In some cases a year or so later, reoperation showed but slight remains of the previous extensive mass. This condition has an etiological analogy in Reclus' explanation of ligneous phlegmon or abscess of the neck, viz., being due to the presence of germs of weakened virulence, acting upon tissues with high resisting powers, which throw up unusual barriers against microbic invasion.

The classification of many primary malignancies of the appendix of the basil cell type has an analogy in Lang's opinion, viz., that ligneous phlegmons are always due to epitheliomatous infiltration, an explanation which is not accepted.

Tuberculous involvement of the appendix has a similar hyperplasia accompaniment. Simple removal of the appendix would have been sufficient in my case. It was a mistake to exsect the contiguous structures. This case induced my study of tumors and retention cysts of the appendix.

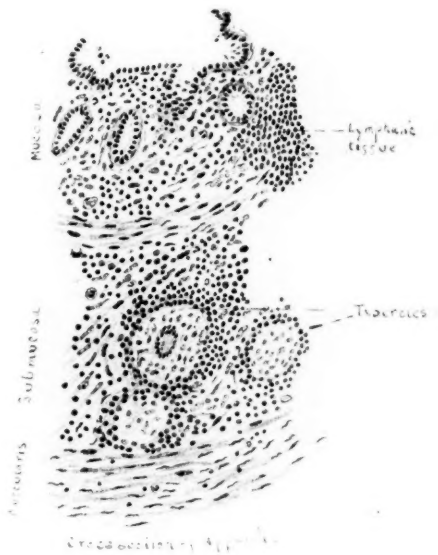


Fig. 14. Tuberculosis of the appendix. Authors' case.

(*Concluded on page 469.*)

TABLE OF CASES OF PRIMARY TUMORS AND CYSTS OF THE VERMIFORM APPENDIX

Type of Tumor, Benign	Reporter of Case	No. Cases	Journal or Book	Year	Mo.	Page	Title of Article	Site of Tumor	Remarks	Age	Sex	Race
Fibroid	A. O. J. Kelly	1	Appendicitis and other diseases of vermiform appendix	1905		437	Mentioned under myoma and fibroma in Kelly's text	Mesentery of appendo-cæcal region				
Myoma	Moschowitz	1	Amer. Jour. Obst.	1908	June		Before N. Y. Obstet. Soc., April 14, 1908	Primary tumor of appendix	Out of 85 various primary cases			
Fibromyoma	A. O. J. Kelly	2	Appendicitis and other diseases of vermiform appendix, Kelly, H. A.	1905		437	Reports mentioned in Kelly's text	Muscular coat	Tumors small. One case considerable calcareous deposit			
Fibromyoma	Haymen	1	Appendicitis and other diseases of vermiform appendix, Kelly, H. A.	1905		437	Reports mentioned in Kelly's text	Muscular coat	Size about 5 mm. in diameter			
Fibromyoma	Moschowitz	1	Am. Jour. Obst.	1908	June		Before N. Y. Obst. Soc., April 14, 1908	Primary tumors of appendix		32	Woman	Cauc.
Polypi	H. A. Kelly	1	His text on the appendix	1905		435	Case No. 7272; woman aged 32, operated on for inflammatory pelvic trouble	Cæcal orifice	Base appendix densely thickened			
Polypi	C. W. Oviatt	1	Kelly's text	1905		436	Specimen and report sent to Kelly	Lumen middle one-third		12	Boy	Cauc.
Polypi	I. R. Trimble	1	Kelly's text	1905		436	Report brief					
Polypi	Carson, St. Louis	1	Kelly's text	1905		436	Report and specimen sent to Bloodgood					
Myxoma	Churton (reported by H. Aboulker; operated upon by Mayo Robson)	1	Kelly's text and H. Aboulker, thèse de Paris	1899		436	Thèse de Paris and Kelly's text	Lumen of appendix		22	Woman	Cauc.
Myxoma	H. A. Kelly	1	Kelly's appendicitis	1905		437	Myxoma	Peritoneal surface	Microscop. exam., myxoma		Woman	Colored
Fibroma	Moschowitz	2	Archiv für Klinische Chirurgie. Also mentioned in Am. Journal Obstetrics	1907 1908	Vol. 82 June	709 836	Zur appendicitisfrage		Size of a bean			
Cysts	James C. Wood	1	Amer. Jour. Obst.	1900	Jan.	15	Cystic distension of appendix	Entire appendix	Found during operation upon tumor; no appendical symptoms	52	Woman	
Cysts	Stimson	2	Annals of Surgery	1896		186	Cyst of appendix	Entire appendix	Found post-mortem			
Cysts	Combemale	2	Bulletin Medical du Nord	1891		223	Hydropisie de L'appendice vermiculaire	Tip appendix	Found post-mortem			
Cysts	Maylard	1	Transactions of Soc. Glasgow Pathologic and Clinical Soc.	Vol. 4		111	Cyst of appendix	Tip appendix	Found post-mortem			
Cysts	Coats	1	Manual of Pathology Glasgow Med. Jour.	2d ed. 1875		753 126	Mentions a case,	Tip appendix	Found post-mortem			

Cysts	L. L. McArthur	1	Am. Jour. Obstet.	Vol. 28 1903	Aug.	275	Trans. of Gynecological Society of Chicago	Entire organ	Operation for hernia		Child	
Cysts	Geo. P. Biggs	2	Medical Record	Vol. 43		536	Appendical cyst	Entire organ	Found post-mortem			
Cysts	Robt. F. Weir	1	Medical Record	Vol. 17	Jan. 10, 1880	44	Appendical cyst	Entire organ	Operated by draining	55	Male	
Cysts	E. E. Montgomery	1	Jour. Am. Med. Assn.	Vol. 29		174	Case similar to Woods'	Entire organ	Found during another operation			
Cysts	Weller Van Hook	1 and 98	Medicine	1896	Mch.	177	Case similar to McArthur's strangulated hernia of cystic appendix	Entire appendix	Hernial sac. Reports 98 similar cases in literature	43	Male	
Cysts	Shoemaker	1	Occidental Medical Times	1892	July	387	Cystic condition of the appendix discovered post-mortem	All but tip	No symptoms. Found post-mortem	60	Male	
Cysts	Baillet	1 & 1	Bulletins de la Soeiété Antomique de Paris	1891		67	Recites another case; author not mentioned					
Cysts	Paul Guttmann	1	Deutsche Med. Woch.	1891	Feb.	260	Hydrops of appendix	Entire appendix	Found port-mortem	70	Female	
Cysts	Virchow	1	Die Krankhaften Geschwulste	1891	Jan.	249			Mentions a case			
Cysts	Wenzel-Gruber	1	Virchow's Archives	1875 Vol. 03	97		Cystic distension of appendix	Middle	Post-mortem		Male	
Cysts	MacLean	1	Munchener Medizinsche Woch. Also quotes Klemm, 3 other cases reported in No. 41, 52 Jahrganges, ibid.	1908	Aug. 18	1746	Cyst formation in remains of appendix vermiformis, February 2	Remains of appendix	Previous attack at age of 12	20	Male	
Cysts	Van Hook quotes Finklestein	1	See Van Hook's article			133	Cysts of the appendix		In Van Hook's reports			
Cysts	Ribbert	6	Virchow's Archiv.	Vol. 132		66	Lectures on path. of appendix					
Cysts	Steiner	3	Virchow's Archiv.	1905		250	Lectures on path. of appendix		In 2,286 autopsies			
Cysts	Boody	1	Virchow's Archiv.	1905		250	Lectures on path. of appendix		In 528 autopsies			
Cysts	Boston City Hospital Reports	16	Virchow's Archiv.	1905		250	Lectures on path. of appendix		In 3,770 autopsies			
Cysts	Rokitansky	1	Lehrbuch der Pathologischen Anatomie				Reported in Van Hook's cases					
Cysts	Berry	1	Jour. of Pathology	1895	Apr.	160	Path. of verm. appendix	Mere mention				
Cysts	Kellynack	1	The Path. of the Vermiform Appendix	1893		60	Path. of verm. appendix					
Cysts	Fenwick	1	Clinical lectures			10	Path. of verm. appendix					
Cysts	Anderich		Deutsche Zeitsch. für klin. Chir.	1886	No. 24		James C. Wood		Case reports			
Cysts	Ziemssen's		Encyclopedia of Med	Vol. 7		361	James C. Wood		Case reports			
Cysts	Orth		Van Hook's article									
Cysts	Leube, Bierhoff, and Treves		Mentioned by Van Hook									

TABLE OF CASES OF PRIMARY TUMORS AND CYSTS OF THE VERMIFORM APPENDIX—Continued

Type of Tumor	Reporter of Case	No. Case	Journal or Book	Year	Mo.	Page	Title of Article	Site of Tumor	Remarks	Age	Sex	Race
Cysts	C. A. McWilliams	3	American Journal of Medical Sciences	1908	June 16	822	Carcinoma of vermiform appendix	Wall	Whole organ removed as acute appendix	20	Girl	German
									Recurrent attacks	25	Male	No recurrence in 9 yrs
								Entire organ	Previous appendectomy not performed but boggy mass was seen on operation			
									Enlarged mesenteric glands			
								Near tip	Acute attack	35	Male	No recurrence in 4 yrs
									Study of 90 cases			
Sarcoma	H. A. Kelly	5	Text on Appendix	1905		450	Sarcoma of appendix					
Sarcoma	Lamers	1	Quoted by Kelly	1905		450						
Sarcoma	Sonnenberg	1	Merely mentions having seen a case. Kelly	1905		450						
Sarcoma	Gilford	1 (?)	Kelly doubts this case Quoted by Kelly	1905		450		Growth had formed around concretion	Questioned as hyperplastic inflammatory process			
Sarcoma	J. C. Warren	1	Boston Med. and Surg. Jour.	1808	Vol. 138	177	Sarcoma of appendix and ileocæcal angle	Entire appendix	Operated upon Chronic appendicitis	6	Boy	
Sarcoma	P. Patterson	1	Practitioner	1903		615	Primary sarcoma of appendix	Distal end Round celled	Operated upon; histological report confirmed diagnosis	39	Male	
Sarcoma	A. C. Bernays	1	Personal communication to Kelly	1902		759	Primary sarcoma of appendix	Distal end. Round celled	Operated; recurred Micros. report	29	Woman	
Sarcoma	Moschowitz	2	Amer. Jour. Obstet.	1908	June	836	Primary sarcoma of appendix	Distal end. Round celled	? Not mentioned			
Sarcoma	Rolleston and Jones	2	Am. Jour. Medical Sciences	1906	June		Primary malignant disease of vermiform appendix	Distal end. Round celled	? Not mentioned			
Myosarcoma	Moschowitz	2	Amer. Jour. Obstet.	1908	June	836		Distal end. Round celled	? Not mentioned			
Sarcoma	Carwardine	1	Kelly's Appendicitis	1905		451		Entire appendix	Round celled	45	Female	
*Carcinoma	Merling	1	Jour. de l'expèrience	1838			Primary carcinoma of vermiform appendix					
Carcinoma	Prus	1	Croziet's Thesis, Paris	1865								
Carcinoma	Rokitansky	4	Med. Jahb.	1863	Bd. 13	179	Colloid type	Appendix proper				
Carcinoma	Maydl	1 (?)	Ueber Darmkrebs	1883			No mention					
Carcinoma	Leichtenstein	1 (?)	Ziemssen Handbuch	1876	vii-2	524	No mention					
Carcinoma	Leman	1 (?)	Kelly's text			324						
Carcinoma	A. W. Elting (3 per.)	40	Annals of Surgery	1903	Vol. 37	549	Primary carcinoma of appendix	Distal two-thirds	At autopsy	81	Male	
								Near proximal end	In course of gyn. operation	36	Female	No return 3 yrs.
								Appendix, cæcum, and ileum and asc. colon	Acute attack	19	Male	

Carcinoma	Moschowitz	3	Annals of Surgery	1903	37	891	Primary carcinoma of appendix	At tip Near tip	Comments upon prevalence in female over male 3–1	37 20 24	Male Female Female	Jew
Carcinoma	Norris	1	Univer. Penn. Med. Bulletin	1903	Nov.	334	Primary carcinoma of appendix	Tip	During gyn. operation	27	Female	
Carcinoma	Weir	1	N. Y. Med. Record	1903		804	Some unusual cases of appendicitis	Tip	Recurrent appendical attacks	23	Male	
Carcinoma	Burnam	1	Johns Hopkins Bull.	1904		136	See following cases	Thorndike, Monk, tip	J.H.H. Surg. No. 9037 Recurrent attacks	25	Male	
Carcinoma	Kelly	3	Kelly's text	1905		439	Boston City Hospital	Tip	Histological exam.	9	Female	
Carcinoma	Thorndyke	1	Kelly's text	1905		744	Boston City Hospital	Tip bulbous				
Carcinoma	Monks	1	Boston Med. & Surg. Journal	1899	140	210	Excision of cæcum for cancer	Entire organ				
Carcinoma	Kelly	1	Kelly's text	1905		441		Omental mass, abscess and adherent appendix	Histological report	19	Man	Negro †
Carcinoma	McBurney	2	Med. Record and Kelly, p. 440	1901	Sept.	478	Carcinoma of distal extremity of vermiform appendix	Limited to tip	Histological report Post-mortem	23 30	Female Male	†
Carcinoma	Draper	1	Boston Med. & Surg. Jour.	1884	Vol. 90	131		Near base	Autopsy	65	Male	
Carcinoma	Reyling	1				441						
Carcinoma	Halsted	1 (?)	Kelly's text			441						
Carcinoma	Glazebrook	1	Virginia Medical Mo.	1895	Vol. 22	211	Case of endothelial sarcomata of vermiform appendix	Near tip	Post-mortem	55	Man	Negro
Carcinoma	Beger	1	Berl. Klin. Wochen.	1882		616	Case of cancer of appendix	Tip		47	Male	
Carcinoma	Harte and Wilson	2	Medical News	1902	Bd. 81	193	Carcinoma limited to appendix, etc.	Near tip Near tip	Recurrent appendicular attacks Appendicular pain	24 25	Female Male	
Carcinoma	Kolaszek	1	Arch. f. Klin. Chir.	1875	Bd. 18	366	Beiträge zur Geschwulstlehre	Stump of appendix Ileopsoas muscles involved	Post-mortem	31	Male	
Carcinoma	*De Ruyter	1	Arch. f. Klin. Chir.				Primary malignant disease of vermiform appendix					
Carcinoma	Rolleston and Jones	58	American Journal Medical Sciences	1906	June	951	(Exclude 21, accept 37. Claim usually spheroidal.) 17 out of 37 spheroidal of R. & J. cases. 5 columnar cell		37 primary removed during life See body of article			
Carcinoma	Sippey		Surgery, Gynecology and Obstetrics	1908	Oct.	Ed. com.						
Carcinoma	Harte (Lit.)	100	Surgery, Gynecology and Obstetrics	1908	June	725	Primary carcinoma of appendix		Divides in 2 classes**			
Carcinoma	Le Conte	1	Surgery, Gynecology and Obstetrics	1908	June	726	Report before Amer. Surg. Assn, May, 1908, carcinoma	Appendix Cæcum		21	Woman	White
Carcinoma	Stimson	1	Annals of Surgery	1896	Vol. 23	186	Before N. Y. Surgical Society	Entire organ	Previous attacks of acute appendicitis	44	Woman	
Carcinoma*	De Ruyter	1	Archiv für Klin. Chir.	1903	Vol. 69	281	Carcinoma development	Mentions a case	No details			

*Kelly's Text, pp. 756, 437–451. † No recurrence.

**Spheroidal type (see body of article), 10 to 40 years; carcinoma, 40 to 60 years. First, no recurrence; 2d, yes.

TABLE OF CASES OF PRIMARY TUMORS AND CYSTS OF THE VERMIFORM APPENDIX—Continued

Type of Tumor	Reporter of Case	No. Cases	Journal or Book	Year	Mo.	Page	Title of Article	Site of Tumor	Remarks	Age	Sex	Race
Carcinoma	Coons	1	Surgery, Gyn. & Obstetrics	1908	July	5	Spheroidal type. Prim. carc. of appendix		Histolog. examination proving case	21	Woman	
Carcinoma	M. Letulle	11	Review Revue de Gyn. de Chir. Abd. (S. G. & Ob.) Sep. '08.	1907	Sept.	875	Cylindrical cellular epithelioma; more or less typical Prim. carc. of verm. appendix	Near extremity	Histolog. reports, tumor not large	10 to 65	3 males 8 females	
Carcinoma	Whipham	1	Lancet	1901	Feb. 2		Primary carcinoma verm. app.	At base	Post-mortem. Histolog. exam.	45	Woman	
Carcinoma	Jessup	1	Proceedings N. Y. Patholog. Soc.	1902	May	55	Prim. carc. verm. appendix. Adenocarcinoma. (States he has collected 13 cases)	Bound by adhesions. Found during other operation	Histolog. report on all cases	36	Woman	
Carcinoma	Neri	1 & 12	Riforma Medica	1904	June 8		Primary adenocarcinoma of appendix	Distal end; growth small, hard	The 12 in literature, majority under 30	29	Woman	
Carcinoma	Cullingworth and Corner	1	Lancet	1904	Nov. 12	1340	Case of carcinoma of appendix	Distal end	Histolog. report	31	Woman	
Carcinoma	Landau	1	Berliner Klinische Wochen.	1906	Dec. 3	1556	Prim. carcinoma of appendix	Distal end	Histolog. report	33	Woman	
Carcinoma	Grünbaum	1	Berliner Klinische Wochen.	1907	Aug. 5	984	A case of prim. carcinoma of appendix	Distal end	Histolog. report	19	Woman	
Carcinoma	Isaac	1	Berliner Klinische Wochen.	1908	Apr. 20	776	Found at autopsy	Appendix totally destroyed	Metastasis other parts	25	Man	
Carcinoma	McWilliams (pers. reviews)	3 90	Am. Journal Medical Sciences	1908	June	822	Prim. carc. verm. appendix	Columnar 22 per cent; spheroidal 53 per cent; transitional 9 per cent; colloid 4 per cent	Enlarged lymphatics in 9 per cent. Four-tenths of 1 per cent of appendices slough			
Carcinoma	J. Riddle Goffe	1	N. Y. Med. Journal	1901	Apr. 13		Primary carcinoma of tip of appendix	Tip	Histolog. report	18	Girl	
Carcinoma	Hurgons	1	During discussion of Goffe article									
Carcinoma	Mason and Rhea	1	Boston Med. & Surg. Journal	1907	Jan. 10		Scirrhous carcinoma. Report of a case of carcinoma of verm. appendix	Epithelium of tip	Histological report showed origin in epithelium through muscular coat	20	Female	White
Carcinoma	Brandts	2	Münschener Mediz. Woch.	1907	Sep. 3	1780	Appendicitis and appendix carcinoma	Distal end	Histolog. report	8	Boy	
Carcinoma	Weber	1	St. Petersburg Med. Woch.	1907	June	213	Primary carcinoma of appendix. Cancer preceded by evacuated appendical absc.	Entire	3 years before	43	Male	
Carcinoma	Zaaijer, personal literature	5 55	Beiträge zur Klin. Chir.		Vol. 54	239	Primary carcinoma of appendix. Comments on ages, 1–10 (1), 10 and 20 (7), 20–30 (22), 30–40 (15), 40–90 (6)		Small carc. in app. 10 to 30 yrs. earlier than large carc. found in intestine			*
Carcinoma	Voleckler (reviews 18)	2	Archiv f. Klin. Chir., Berlin		Vol. 86 No. 2	477	Early presence leads to early operation	Distal end Entire organ	Chronic appendicitis Cæcal tumor	27 50	Female Male	
Carcinoma	Wahlgren	1	Upsala Takareformings Fonhandlingar	1908	Vol. 14	108	Primary cancer of processus vermiformis		Symptoms 2 weeks' standing	15	Girl	†

Carcinoma	Elizabeth Hurdon	1	Johns Hopkins Hosp. Bulletin	1900	July	175	Already mentioned under head of Kelly's cases	Middle	Chr. abdom. pain Operated on by him	24	Female
Carcinoma	Wells	1	N. Y. Obstet. Society	1908	Apr. 14	835	Prim. carc. of appendix in girl of 20. Reports 18 cases in literature	Distal end	20 months chronic hist. appendicitis Report	20	Girl
Carcinoma	A. O. J. Kelly	4	Am. Jour. Med. Sciences	1908		851	Primary carcinoma and endothelioma of vermiformis appendix	Case v, entire organ (colloid) VI, near proximal end VII, at tip VIII, tip	Acute appendicitis Acute appendicitis Chronic abdominal pain Acute appendicitis	23 17 27 28	Female Female Female Female
Carcinoma	T. J. Watkins	1	Amer. Jour. Obstet.	1909	Apr.	633	Carcinoma of appendix Trans. of Chicago Gyn. Soc.		Chronic appendicitis several months	34	Woman
Carcinoma	Clarence Webster	1	Amer. Jour. Obstet.	1909	Apr.	635		Colloid	Discussion of paper		
Carcinoma	Day and Rhea	1	Boston Med. & Surg. Jour.	1908	Dec. 3	748	Carcinoma of verm. appendix. Probably primary. Scirrhous carcinoma	Tip	Occasional appendicular pain for 2 mos.	9	Child
Carcinoma	E. H. White	1	Am. Jour. Med. Sciences	1908		702	Primary colloid carcinoma of vermiform appendix	Entire organ	Intestinal obstruction Autopsy	75	Female
Tissue hyperplasia, simulating malignancy	Kelly	1	Kelly's text	1905		443	Ileocæcal tumor	Retrocæcal appendix surrounded by dense mass	Histological report showed dense inflammatory tissue only	24	Woman
Tissue hyperplasia, simulating malignancy	Crouse	1	See body of article	1910			Ileocæcal tumor	Omental tumor incorporated	Histolog. report. (See cuts)	23	Man

Colored

Cauc. ††

*25 cases followed, 4 for 3 years, 4 for 5 years; 3 instances of recurrence in 52 cases. †3 years, no recurrence. **Not mentioned. ††No recurrence 1 year.

(*Continued from page 463.*)

The appended index needs some slight explanation. It is incomplete in many details, especially as to age incidence, type of tumor, etc., due to the difficulty of securing the original articles instead of reviews.

In conclusion, the following points appeal to me as being the salient ones of a study of primary malignant growths of the appendix:

1. The appendix should always be investigated while doing other intra-abdominal work.

2. That many so-called spheroidal cell primary carcinomas of the appendix may be simply remains of imperfect tissue repair.

3. Why should the simple removal of an organ, an integral portion of a continuous structure, seemingly malignantly involved, give nearly an absolute good prognosis in 57 per cent of all malignant cases and 100 per cent of the spheroidal type?

4. That perhaps pathological histology is not as yet an absolute finality, in differentiating between basil cell growths and imperfect tissue repair.

5. That it is strange that one small portion of the human anatomy has a resistant force not possessed by any other part in withstanding the attack of a malignant growth, if the so-called spheroidal cell growths are malignant.

6. That age incidence, metastasis, and recurrence should vary so in appendical malignancy from other portions of the human economy when similarly assailed.

7. That early symptoms and early operation may, in the main, explain the good prognosis in primary carcinoma of the appendix vermiformis, when such is of the spheroidal type.

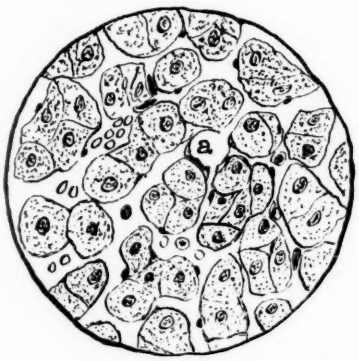
These queries are not refutations, simply inquiries.

FURTHER STUDIES IN THE ETIOLOGY OF CHOLECYSTITIS

By J. EARL ELSE, Ph. G., M. S., M. D., Pullman, Washington

INFECTION may reach the gall-bladder through several different channels. The atrium from which the infection comes may lie anywhere in the body, but is most frequently in the bowels. Of the different channels, first and most frequent is that by way of the common and cystic ducts, as was pointed out in a previous communication (1). As was shown at that time by animal experiment, infection does not readily ascend the ducts under normal conditions, but in the presence of impaired peristalsis it does. The manner of ascension is probably by continuity of surface. It may occur, however, by infection of the bile (which does not possess the germicidal properties that were once attributed to it) at a time when there is stasis in the ducts, the infection thus reaching the gall-bladder, in rare cases even without the involvement of the mucous membrane. It has been suggested that the infection may ascend along the duct through the lymphatics. This seems improbable, however, for when we refer to the histology of the parts, we find that there are few lymph channels along the gall tract and that the gall-bladder has no lymph nodes. We further find that the gall-bladder develops from a protrusion from that portion of the foregut which afterwards forms the duodenum. In studying the lymphatic system we find that the lymph always flows central, never distal. The lymph in the lymphatic vessels connected with the gall tract therefore flows away from the gall-bladder, not toward it. So it would be very improbable, if not impossible, for the infection to reach the gall-bladder from the intestines through this channel.

Second, the blood stream. (*a*) Adami has advanced the theory that the most frequent route is through the portal vein. The organisms, reaching the portal vein along with the food substances during the natural process of digestion, are carried to the liver, where they are removed from the blood stream and excreted into the bile capillaries either dead or in an attenuated form. The objections to this theory are, first, it is contrary to the function



Human liver (slide No. 522, author's collection) X 1,000. a, Intralobular vein. Bile capillaries are seen within the groups of cells. Blood corpuscles are seen between the groups of cells.

of both the epithelium and leucocytes, as it is understood at the present time that the one should permit living organisms normally to pass through, and that the other should assist in carrying them. One of the functions of the epithelium is to protect from, and keep out, infection, and the leucocytes aid in the destruction of bacteria. Second, the liver cells lie in groups in the meshes of the capillaries, but are outside of the capillary walls, as shown in the accompanying illustration. The terminal bile ducts start in the center of these groups of cells, so that organisms to reach them must first pass through the capillary walls, then through or between the liver cells, and this would seem hardly possible under ordinary circumstances. To recapitulate, organisms in order to reach the gall tract from the intestines by a normal process must first pass through the normal mucous membrane of the bowel and then through normal liver cells. Third, should infection reach the portal vein, it probably would pass into the general circulation, for the capillaries in which the portal vein terminates are the capillaries from which the hepatic veins have their origin, and these capillaries being of sufficient size to permit the blood cells to be readily carried through,

would also permit bacteria, which are much smaller, to be readily carried through.

(*b*) General circulation. It is a recognized fact that infection is disseminated and reaches all other organs and tissues through the general circulation. Then, why might it not also reach the gall-bladder in this manner?

Third. Extension by continuity of surface from other sources of infection.

Fourth. Rupture of a liver or other abscess into the gall-bladder or extension from such abscess.

Fifth. Infection by perforation of foreign body from the intestinal tract (2).

Sixth. Infection from without as in stab wounds, gunshot wounds, etc.

This work was undertaken for the purpose of throwing more light upon infection through the blood stream, and to determine, if possible, which is responsible for the most cases of cholecystitis, the portal system or the general circulation. All work was done upon rabbits, with the exception of two experiments quoted from a previous communication, and under strict aseptic and antiseptic precautions. The bacillus pyocyaneus was used, as this organism is not present normally in the gall-bladder of the rabbit, as shown before (1), and it is an organism that is easily identified.

SERIES I

Problem. Do organisms readily reach the gall-bladder through the general circulation?

Technique. A ligature was placed about the cystic duct, care being taken not to include the cystic artery. One cubic centimeter of a virulent culture was injected into a superficial vein. Later, a culture was made from the gall-bladder.

No.	Animal Used	Date of Exp.	Hrs. Elapsed before Culture Made	Results
1.	Rabbit (white)	Mar. 28	48	Positive
2.	Rabbit (black)	Mar. 31	48	Positive
3.	Belgian hare	Apr. 5	48	Positive
4.	Rabbit (black)	Apr. 9	48	Positive
5.	Rabbit (tan)	Apr. 9	48	Positive

The ligature prevented the ascension of infection from below so that the bacilli could reach the gall-bladder only through the cystic artery. Hence this series demonstrates that organisms in the general circulation reach the gall-bladder readily through the terminal arteries and capillaries the same as they reach other organs. This work agrees with that of Joseph Koch (3), who reports finding emboli made up of bacilli in the capillaries in the wall of the gall-bladder.

SERIES II

Problem. Will infection reach the gall-bladder from the portal vein?

GROUP 1. *Technique.* One cubic centimeter of the culture was injected into the portal vein. Later, a culture was made from the gall-bladder.

No.	Animal Used	Date of Exp.	Hrs. Elapsed before Culture Made	Results
1.	Belgian hare	Apr. 15	48	Negative
2.	Rabbit (black)	Apr. 15	24	Negative
3.	Rabbit (black)	Apr. 19	24	Negative
4.	Dog	May 5, '09	32	Negative
5.	Dog	May 22, '09	103	Negative

(The last two experiments have been previously reported. Two cubic centimeters of the culture were injected into the portal vein of the first dog and four in the second.)

This group of experiments shows that when organisms are injected into the portal vein they do not readily reach the gall-bladder, but it does not show that they did not reach the bile, for they may have been carried on down the common duct instead of ascending the cystic duct into the gall-bladder from whence the culture was made. In order to determine whether the organisms did reach the bile, the following experiments were made:

GROUP 2. *Technique.* The common duct was ligated and one cubic centimeter of the culture was injected into the portal vein. Later, cultures were made from the gall-bladder.

No.	Animal Used	Date of Exp.	Hrs. Elapsed before Culture Made	Results
1.	Belgian hare	Apr. 12	12	Positive
2.	Rabbit (black)	Apr. 28	30	Positive
3.	Belgian hare	May 3	12	Positive

This group proves that when infection is injected into the portal vein it will reach the bile. There are two possible routes through which the infection may have gone, first, by passing through the capillaries from the portal vein to the hepatic veins, then through the general circulation to the gall tract, through branches of the hepatic artery; and second by passing from the capillaries through the normal liver cells into the bile radicals. Now if the cystic duct were ligated and infection injected into the portal vein, it would determine the route, for if it were by the general circulation the gall-bladder would become infected, as the organisms would reach it through the cystic

artery. On the other hand, if infection of the gall-bladder be through the portal route, the contents of the gall-bladder would be sterile, for with the cystic duct ligated there would be no way for the infection to reach it. Accordingly the following experiments were made.

GROUP 3. *Technique.* The cystic duct was ligated, care being taken not to include the cystic artery. One cubic centimeter of the virulent culture was injected into the portal vein. Later, a culture was made from the gall-bladder.

No.	Animal Used	Date of Exp.	Hrs. Elapsed before Culture Made	Results
1.	Rabbit (black)	May 7	48	Positive
2.	Rabbit (black)	May 7	48	Positive
3.	Rabbit (black)	June 15	12	Positive
4.	Rabbit (black)	June 16	6	Positive
5.	Rabbit (black)	June 16	18	Positive

This group proves that infection passes from the portal vein to the hepatic veins through the capillaries and thus reaches the gall-bladder through the general circulation. And this series demonstrates, first, that infection of the gall-bladder from the blood is through the arteries, and second, should infection reach the portal vein it is transmitted to the gall-bladder through the general circulation.

CONCLUSIONS

1. Infection usually reaches the gall-bladder by ascending the common and cystic ducts from the bowel.

2. Infection readily reaches the gall-bladder through the cystic artery.

3. Infection rarely or never reaches the gall-bladder by passing directly from the portal vein to the bile radicals.

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ABSCESS OF THE LIVER[1]

A STUDY OF FORTY-SEVEN CASES OF ABSCESS OF THE LIVER, WITH SPECIAL REFERENCE TO THE DIAGNOSIS, PROGNOSIS, AND TREATMENT OF THE INDIVIDUAL CASES

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SINCE my former paper read before the Society two years ago, I have had forty-seven cases of this disease, and a study of these cases has led me to conclude that an accurate diagnosis can be made without the aid of the aspirating needle. Also there are a few points in the prognosis of the individual case to which I desire to call attention. These cases, in the main, were treated here during the last two years, and there is more data with regard to blood findings than I was able to present in my former paper, either from our work here or from a study of the literature.

The relative occurrence among the different races is of interest. This relation could be determined only among the employees. Among the whites from the United States there were nine cases, or about one case in every 1,178 employees. Among the whites from Europe, etc., there were six cases, or about one case in 2,240 of this class of employees. Among the black laborers there were eighteen cases, or about one case in every 3,722 colored employees. So that it appears that the white man from the United States is the most susceptible of all laborers, and the colored employees from the islands the least susceptible.

In studying these cases I found that they fell naturally into several different classes:

1. The very severe toxic.
2. The ordinary acute.
3. The subacute.
4. The chronic.

THE VERY SEVERE TOXIC FORM

This group is characterized by the acuteness and the severity of the process. The fever may take almost any form; it may be inter-

[1] Read before the Canal Zone Medical Association, March, 1910.

mittent with recurring chills and sweats or with a high remittent form or a simple continuous fever ranging above 103°, but in all of these cases there is a marked toxicity in the appearance and condition of the patient. Also in this class, the highest percentage of polymorphonuclear leucocytes occur.

In this class there are three distinct subgroups based mainly on the pathological conditions:

A. The single acute toxic. In this form the abscess cavity is without any definite wall or lining membrane, and its contents consists of blood serum, red-blood corpuscles, and granular detritus. The liquifaction and necrosis occur more rapidly than the reactionary inflammation in the liver tissue. In two of these cases I was able to demonstrate by the sounding of the abscess cavity and the determining of its size that the cavity steadily increased in size for two weeks after the opening of the abscess. This is entirely different from what takes place in the ordinary abscess with the characteristic pus, where the cavity tends to contract after opening it and continues to do so. There were five cases in this group, with three recoveries.

B. The multiple abscesses. There were four cases with two recoveries. In two of these the liver was studded with small abscesses varying in size from a pea to an orange, a type of disease which is necessarily fatal. In the other two cases one had two abscesses the size of a small orange, and the other three abscesses the size of hickory nuts.

C. Abscess with associated dysentery. In this group there were five cases with one recovery. It represents a severe type of the disease and one usually fatal, as you have not only the toxicity of the liver abscess, but also the toxicity of the exacerbation of the ulcerative colitis.

THE ORDINARY ACUTE

In this form the patient while sick does not present the extreme toxicity of those mentioned above. The fever varies from 101.5° to 103°. He has a leucocytosis and differential polymorphonuclear percentage of about 79 to 80 on an average. The general appearance of the patient would compare with that of the ordinary malarial case. In this group there were sixteen cases with fifteen recoveries.

THE SUBACUTE TYPE

This group includes those cases showing only a very mild toxicity to the process, and also a few smaller abscesses, about the size of an orange, well walled off. The temperature varies anywhere from normal to 102°. It is usually irregular, may run normal for a day or two, followed by a low intermittent fever, or there may be a low continuous fever varying from 100° to 101°. The patient does not feel very sick, is up and about, but is disinclined to work. There is usually a low leucocytosis, with an average polymorphonuclear percentage of 77. In this class there were thirteen cases, all recovering.

THE CHRONIC TYPE

This includes the neglected cases who have had the disease three months or longer. They are greatly emaciated, with a huge liver and ascites. The temperature is usually normal and there is very little pain or discomfort, also a well marked leucocytosis with a high polymorphonuclear percentage averaging over eighty. In this group we find the largest abscesses, all of them being about ten inches in diameter and in two of them an eleven inch clamp did not reach the wall in all directions. In two of these there was only a shell of the right lobe left; naturally this group is of unfavorable prognosis. In this group there were four cases with two recoveries.

In the diagnosis of the usual abscess of the liver there are three main factors to be considered:

First: Fever, usually of a continued or remittent type.

Second: An enlarged and a more or less tender liver.

Third: An increase in the polymorphonuclear percentage.

Also, of course, the negative feature that this symptom-complex is not explained by any disease in other parts of the body.

There are occasional exceptions to all of these points, as very rarely there will be no fever or the liver is made out to be normal on percussion, or the leucocyte count comes within the normal limit; but as a general rule I believe that the three factors above mentioned are of almost absolute diagnostic significance if con-

sidered in accordance with some of the normal variations of the disease.

The fever may be of almost any type. The usual type is a continued fever or with slight remissions, varying from 100° to 103°. More exceptionally there is a remittent fever or no fever. Again, the fever may be very high and of an irregular remittent character, which form is usually associated with a very severe or septic type of the disease. At the onset of the disease we usually find the continued fever, and a little later, if the abscess walls off, this fever begins to fall and runs a lower course. On the other hand, if the process is extending or the limiting wall not forming, the tendency is for a more remittent fever to result and the daily variation in the temperature curve to increase in size. This form of fever is also found in cases of multiple abscess, and frequently also where a dysenteric process is associated. In the chronic cases we find very little fever, usually ranging about 100°, in some cases running almost normal, and in two cases here the temperature was absolutely normal for a week.

The second important sign is the enlargement of the liver with tenderness associated. The enlargement is both general and local. Some enlargement of the liver can be made out in practically all cases, and where the abscess is near the surface there is usually localized enlargement as well. In the subhepatic variety the local enlargement can be easily made out; also in those situated in the anterior part where the enlargement extends to the epigastrium, often reaching to the umbilicus. Enlargements of the dome are the most difficult to make out and also the most important. The abscess may tend to work toward the anterior surface, the lateral, or the posterior, which is the point to be determined, if possible, for the sake of reaching the abscess where it comes nearest to the surface. To determine this a most careful percussion of the relative and absolute dullness of the liver is necessary and also the relation of these lines to each other. The absolute border of dullness may show a local bulging upward and the normal concave outline changed to a convexity in some portion of the line. In the majority of cases it is possible to determine in what part of the liver the abscess is located.

Again, the effects of the enlarging liver upon the lung should be carefully determined, looking especially for signs of compression of the lung and of diminished functioning in some parts of the lower lobe adjacent to the liver; also, if the process has extended, there may be small areas of pneumonia, capillary bronchitis or slight pleurisy with effusion.

An additional important sign associated with the diaphragm are small fine crepitations, localized to some area on the surface of the liver. This sign is one to which Dr. Deeks has called attention and shown its importance, especially in the localization of the abscess. These can usually be heard where the abscess lies near the dome or near the convex surface of the liver. Later on they may disappear, again to be followed by a friction, and still later in delayed cases by adhesion of the liver to the diaphragm.

The third main diagnostic factor is the increase in the leucocyte count with an associated increase in the polymorphonuclear percentage. All writers agree that there is usually a leucocytosis in these cases, but there have been quite a number of cases reported with a normal count, so that as a rule it is not absolute. The highest leucocyte count here was 36,000; there were four above 30,000 — all of whom recovered; the lowest count was 5,600; the next two were 6,400 and 6,500. The case with 6,500 resulted fatally, but it is interesting to note that the polymorphonuclear percentage was 88 in this case. The other cases ranged between 10,000 and 30,000. The average of all cases was 18,760. The average in eleven chronic cases was 15,900; the average in ten fatal cases was 21,450.

The differential leucocyte count is also necessary and of far more value especially in prognosis. The highest polymorphonuclear percentage was 93 and the lowest 69; the average was 79.7. The average polymorphonuclear count in a series of the different grades according to the classification mentioned above is very interesting. In the subacute or mild infections with the fever below 101° the polymorphonuclear average in eleven cases was 77 per cent; in the ordinary acute case with the fever below 103° the average in ten cases was 79.5 per cent; in the severe acute cases with a fever above 103° the average was 83 per cent; in four cases of

multiple abscess the average was 83 per cent; in four cases with dysentery associated, the average was 82 per cent. In the chronic cases, four,— with a history of three months or over, — the average was 80 per cent. The highest polymorphonuclear count was found in those suffering from the more severe form of the disease or some complication of the disease. Also, the polymorphonuclear count is of value in the prognosis, as in sixteen cases where the percentage was below 80 there was only one death, or a mortality of 6.6 per cent. In seventeen cases where the polymorphonuclear percentage was from 80 to 84 there were five deaths, a mortality of 29.5 per cent; in twelve cases where it was 84 or above, there were six deaths, a mortality of 50 per cent; or with a percentage below 80 the mortality was 6.6 per cent, but above 80 the mortality was 38 per cent.

The accessory diagnostic features may be summarized as pain, tenderness, and slight muscle spasm in the right epigastrium, basal lung trouble, friction sounds near the liver, effusion into the pleura, effusion into the peritoneum, and dysentery. True lung changes and the effusions into the pleura or peritoneum are found only in old cases. Tenderness in the epigastrium was present in practically all the cases; also more or less spasm of the rectus, a sign emphasized by Twining, was present in the majority of the cases.

Pain in the side or over the liver, or in the shoulder, a symptom on which authorities lay great stress, is of value mainly in directing attention to that part of the body. It is usually a complaint of the patient. The cases here complained of:— pain in the side, 12; pain in side and shoulder, 2; pain over the liver, 3; pain in the abdomen, 7; pain in the epigastrium, 4; in the lower chest, 3; in the shoulder, 2; other complaints were, chills and fever, 12; dysentery, 2; weakness, 2. So that, the majority of the patients have directed attention to the part diseased. Dysentery is given as another of the important associated symptoms. It was present before admission to the hospital, in 12 cases; during the year preceding admission in 5 cases; during the second year preceding, in 2 cases. Five others have had dysentery 4, 6, 8, 14, and 15 years respectively, before admission. Ten cases denied ever having had dysentery.

Dysentery complicating abscess of the liver is also of interest from the prognostic standpoint, as of the twelve cases who gave a history of having had dysentery right up to admission, in five the dysentery continued while in the hospital, and four of these resulted fatally. In cases where dysentery breaks out after the operation, the prognosis becomes very grave, as where this occurred in eight cases, they all resulted fatally.

The question of the localization of the abscess in the liver becomes most important, and I believe in the majority of the cases this can be determined. In the first place the usual position of abscesses in the liver should be remembered. There occurred twenty-five, or half of the cases, in the vault laterally, where the nearest point was in the axillary line pointing toward the eighth and ninth interspace; two occurred in the vault posterior, close to the spine; four anterior, close to the sternum; three in the epigastrium; five abdominal or subhepatic. In the left lobe, two occurred in the vault and two in the epigastrium, so that it is seen that half of the liver abscesses must be reached through the chest in the lower axillary region. This is known as the point of election, described by most writers on this subject. The data obtained by percussion, the lung signs, and the fine perihepatic crepitations I have already called attention to. An additional sign, pointing to abscess formation on the convex surface, is afforded by the rate of respiration, as in thirteen cases where the respirations were above 28, eleven of these occurred in vault abscesses, the other two occurred in abscess of the convex surface with an overlying plastic peritonitis.

These cases have also furnished some interesting data in regard to prognosis. Where the temperature was below 100° there were thirteen cases with one death; where it was below 101°, twelve cases with two deaths; where it was below 102°, thirteen cases with two deaths; and where it ranged about 103° or over, or of the high remittent character, there were eleven cases with eight deaths. The progressing mortality with the increase in the polymorphonuclear leucocytes I have already called attention to,

also, the gravity of the case where the dysenteric process continued; likewise the presence of ascites is unfavorable, as is also true inflammatory disturbances in the lung. Post-operative unfavorable features are: the fever continuing, or taking on a remittent type, and a continuation of the dysentery.

In the treatment of this disease the one vital necessity is that the abscess should be opened at its point of election, which would be the point where the abscess approaches nearest the surface of the liver. In the acute severe form of the disease this can only be determined by an exploratory laparotomy.

Localization of the abscess by means of the aspirating needle is unreliable, and though usually harmless, there have been fatalities reported from it. Also it does not give the point of election for opening the abscess, unless you make several needle punctures fairly close together, and a second abscess is easily overlooked. The exploratory laparotomy takes very little, if any longer time, the presence or absence of multiple abscesses, also adhesions and the point of election of opening the abscess can be determined, and these points are of vital importance in the treatment of the case.

Accordingly, in the severer forms of the disease, where we are dealing with either an acute or toxic form, multiple abscesses, or abscesses with dysentery, the first step should be an exploratory laparotomy, as these cases must be opened early and thoroughly in order to avoid a fatal termination.

Many of the ordinary acute abscesses can be located absolutely, and in these cases, it is safe to cut down directly upon the abscess. In the subacute and chronic forms there is usually little, if any, difficulty in the localization of the abscess and thus operating directly upon it.

In all cases where there is the slightest doubt as to localization, the safest plan is to perform an exploratory laparotomy and then determine by direct palpation of the liver the focus of inflammation. Also where the symptom-complex, referred to above, is not explained by disease elsewhere in the body, the advisability of an exploratory laparotomy should be considered.

THE END RESULTS OF SURGICAL OPERATIONS FOR THE RELIEF OF NEURASTHENIA ASSOCIATED WITH THE VARIOUS VISCERAL PTOSES[1]

By W. M. POLK, M. D., New York City, New York

THE end results of surgical operations for the relief of neurasthenia associated with the various visceral ptoses depend chiefly upon the order of precedence; for, while a ptosis would add to a neurasthenia already existent, and a neurasthenia might increase a ptosis (relaxation being a factor in the ptosis), the end results of surgery must be more or less gratifying, in keeping with the relation the two conditions bear to each other in this order of precedence.

The necessities of any surgeon working in the abdominal cavity force upon him a knowledge (which he makes more or less complete) of all ptoses in this region.

Those of us who direct attention to the diseases of women, the more common victims of the condition, and by far the more frequent exponents of neurasthenia, must, therefore, have opportunity to work upon the problem presented here for discussion.

For convenience of study some of us classify abdominal and pelvic ptoses as follows:

1. Such as occur in people whose abdominal and pelvic confines are anatomically normal, but relaxed, and whose organs are enlarged or dilated.

2. Such as occur in people who have breaches in abdominal or pelvic confines or in both.

[1] Read before the American Gynecological Society, May 5, 1910.

3. Such as occur from undernutrition (movable kidney).

4. Such as are due to embryonal faults.

Classes 3 and 4 I leave to others to discuss.[1]

We are disposed to draw distinction between prolapse and distension of an organ. For instance, between a distended cecum and ascending colon, and one prolapsed; and similarly in like conditions of the stomach or sigmoid. This throws out of this discussion no inconsiderable number of neurasthenics who because of such dilatations, without ptosis, can fairly have their ailment traced to auto-intoxications, dependent thereon. If this, however, be considered a refinement, the distinction may be set aside.

I cannot persuade myself that operation is called for in class 1 until every rational non-operative method has been properly tried, the nature and extent of which is perfectly familiar to this audience. Prior to such treatment the end results of operation would be futile. The persistence of the symptom defect, after adequate non-operative treatment, warrants operation; primarily, for further inquiry; secondly, for application of operative remedy upon the dilated or distorted organ. A conspicuous illustration of this contention is found in the younger unmarried women and at the menopause. In the former you have introduced a uterine ptosis of embryonal origin, where cervical stenosis, inducing obstruction to menstruation, leads through chronic endometritis and metritis to abnormal anteflexion, or retroflexion (the uterus being enlarged and softened) and to chronic ovaritis. At the menopause, senile processes sometimes cause encapsulation of a secretion in the uterine cavity, with chronic endometritis and metritis as a result. Here in both conditions dilatation and curetting give most gratifying end results. The plication or resection or fixation of a flabby, nerveless sigmoid, colon or stomach, in neurasthenics, in whom all other measures have failed, is to be commended.

The results of operation for ptosis dependent upon breaches in the confines of the abdominal and pelvic cavities, whether ptosis be independent of, productive of, or add to existent neurasthenia, are in themselves so good we must accept them; and that the end results are good is self-evident. For instance, in hernias. In this connection, what are the end results of operations for ptosis of pelvic organs dependent upon breaches of pelvic floor? This is the greatest field of associated or induced neurasthenia, and nowhere are end results of surgery more conspicuously favorable.

Apart from the intimate relations between these organs and human emotions, the facts of childbirth are suggestive. A large, firm mass, filling all spare space in the pelvis, is pushed or sometimes drawn through the pelvis, passing directly through the pelvic floor, always stretching it, sometimes tearing it, leaving it a bruised and flaccid structure. Perhaps to this is added the deteriorating influences of inflammation. The organs displaced have each very direct and intimate relation to hourly physical comfort. Rectal and vesical tenesmus alone are as annoying to the individual as any other symptom the body is capable of sustaining. Add the reactions coming from the congested or inflamed uterus and ovaries, and a combination is presented sufficient to cause neurasthenia of the stoutest nervous system — certainly to add to it if already existent.

Let us present a comparatively trifling illustration. High-forceps delivery, tear through the cervix and vagina into subperitoneal cellular tissue, infection, healing by slow granulation. Contracted cicatrix, free motion of entire pelvic floor, except on line of cicatrix, upon which tension is therefore exerted; pain therefrom, reflected to uterus and ovary and thence to central nervous system. Relief, following correction by operation. The end results of repair of perineum with correction of the associated cystocele and rectocele is another illustration; and a brilliant illustration is given in the results of operation in complete procidentia uteri with its associated ptosis of the bladder and to a less degree the rectum.

I do not know how far this discussion permits reference to any particular kind of operation, but risking a call to order by the chair I shall attack the end results of accepted operations for the relief of uterine ptosis. Time limits the attack to the bare statement that all of them permit more or less relapses and some of them create conditions which in turn pro-

[1] See SURGERY, GYNECOLOGY AND OBSTETRICS, July, 1910, p. 59.

voke a status as favorable to neurasthenia as that for which operation is done originally. The fault lies in the substitution of suspension for support. Elsewhere I have traced the growth and development of this substitution, for that it is a substitution the history of the treatment of ptosis of the uterus easily shows. When Koeberle, at Strassburg, in March, 1869, did ventrofixation of the uterus, the substitution began; the pessary and its mechanisms during the forty years that have ensued have been gradually but steadily retired. The pessary *is* support, not to the whole pelvic floor, but to its upper peritoneal layer, and in turn rests upon and derives support from the muscular, the lower, the outer layer. (The differentiation of the two is easily appreciated in the normal nulliparous woman, as the examining finger is pressed into the yielding region between the two, the region round and about the upper two-thirds of the vagina, especially if at the same time the cervix be fixed. Examination per rectum with or without fixing the cervix confirms the demonstration.) When this upper layer yields, ptosis results. The essentials of the layer, starting on either side of the rectum posteriorly, extend around the inner wall of the pelvis, and then inward to meet at the vagina and bladder in front. Its composition and subdivision we know; what may happen to it in labor and the puerperium we know. Now add the relaxation and stretching seen in the flabby and the nerveless in the subjects of pelvic, uterine or ovarian inflammation. In all instances the organs it supports follow its decline, a most striking illustration being found in simple retroversion with or without flexion. It drops and its lower segment shifts forward, its upper loosely swung portion drops backward, being more or less influenced by the posterior attachment of the broad ligament. Between the sliding forward of the lower segment and the restraining influence of this posterior attachment of the broad ligament, the organ gradually presents its anterior face to the intra-abdominal forces and the ptosis is fairly initiated. The end results of any operation for this form of ptosis will be wanting unless the functions of the upper pelvic floor are restored. The pessary does this, but not to satisfaction. Suspending operations do not attempt it. Operations to this end made through the portals of the lower floor have a great handicap incident to the line of approach. Approach it from above and you can bring to bear upon it every device surgery affords. There is no more reason to avoid this kind of approach than forty years ago contraindicated dilating and curetting a uterus. And with the same study given to the anatomy, physiology, and pathology of this layer of the pelvic floor, which has been given the lower layer, there is every reason to believe that the end results of operations for the correction of neurasthenia due to ptosis of the pelvic contents (certainly the urogenital forms, which constitute 90 per cent of them) will be satisfactory.

We claim control of what exists in the pelvic cavity, and I am quite sure that the experience of any man who works in this region of the body surgically or non-surgically will bear out this statement, that the end results of surgery in this region are to be commended. Now, it is not to be denied that even in these cases, and more particularly in such ptoses as have been described as belonging to the upper abdominal cavity, we have conditions before which we balk. But here I am convinced that orthopedics furnishes a most efficient aid, and the lines laid down by Dr. Reynolds and by Dr. Lovett, of Boston, who has been associated with him, are to my mind the means of benefiting very many of the conditions for which, up to the present time, surgery has been considered the only means of relief. But as Dr. Richardson has said, the psycho-neurologist should not be forgotten in connection with this work. If we could persuade our people that such a cure is possible, and that surgery is not to be introduced except for definite pathologic conditions, I believe it would go a long ways toward throwing much of the responsibility upon the shoulders of others rather than all of it upon the gynecologist and surgeon.

Unfortunately the attitude which most of us assume is this: We have made ourselves efficient abdominal surgeons. We are proud of our achievements. We have acquired something which is good, and we know this, and the inevitable tendency of the human mind under such circumstances and with such a possession is to apply it on any and all occasions. I do

not care how conscientious we may be in differentiating our desires from our duty, even those of us who feel ourselves good enough to stand on the platform with the saints will fall. If there is one thing above all others to which I would like to call attention it is this, that there is no reason why we as gynecologists and surgeons should bear all the burden in these cases. I have long since come to the conclusion that there is a conspiracy on the part of the neurologist to land on us a class of cases which he knows full well will tax every single particle of his acumen. Here is a brilliant opportunity for the psycho-pathologist, the psycho-neurologist, to exploit himself to the fullest extent. I do not know of a class of patients more in need of this kind of application of their growing knowledge than these neurasthenics. Finally recommending this: If these people come to you, say to them, you must pass first through the hands of a competent orthopedist. You must pass next through the hands of a conscientious, self-doubting neurologist, but beware of the overconscious and overconfident neurologist, and then you can say, madam, or sir, as the case may be, I will take up your complaint now that you have reached the end of all things so far as medical investigation is concerned, and you will command all my resources and refinement in the art of surgery.

A CONTRIBUTION TO THE STUDY OF BLOOD SUPPLY OF THE LIVER

With the Report of an Illustrative Case

By EDWARD STAEHLIN, M. D., Newark, New Jersey
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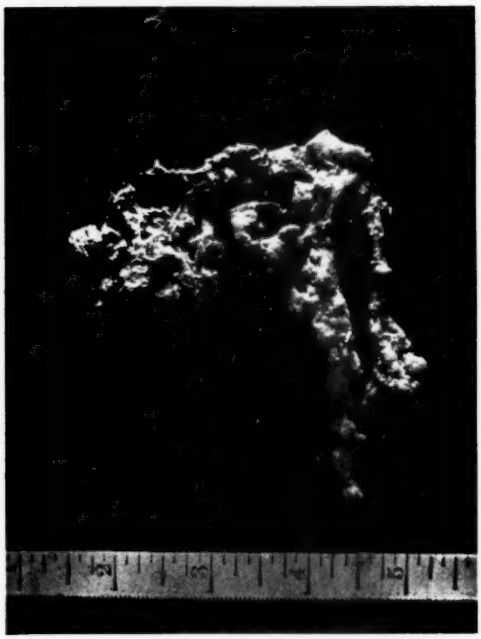
IT is the consensus of opinion among anatomists that the right and left lobes of the liver are vascularly independent (1). "The liver as distinguished from most organs has two sources of blood supply, the portal vein and the hepatic artery, which commingling form a plexiform capillary network in the meshes of which the liver cells are arranged. Ultimately the capillaries unite again to form the radicles of the hepatic vein — the rectilinear veins of Sabourine — which empty into the so-called central vein" (2). The hepatic artery is the nutrient artery and supplies as vas nutriens the tissue of the capsule of Glisson and the interlobular canals inclosed by the capsule. There the blood enters by means of a plexiform network into communication with the interlobular branches of the portal vein, thence into the capillaries of the acini (3), and so the hepatic artery supplements the function of the portal vein. The reverse never takes place. "It has long been known and Opie (4) directs renewed attention to the fact, that one of the important characteristics of the liver is its susceptibility of variations in the blood pressure, saying the portal vein, hepatic artery, and hepatic vein are in such free communication that the entire lobule can be injected from any one of these vessels, hence artificial injections do not define the intralobular distribution of the portal and arterial blood, for doubtless differences of venous and arterial pressure have a part in determining peculiarities of the circulation within the lobule. Opie's experimental studies led him to the conclusion that both the hepatic artery and portal vein pour their blood into the periphery of the lobule, and here the influence of arterial blood pressure is most strongly felt. When foreign material reaches the liver by the portal vein it is washed from the peripheral zone by the arterial blood and tends to be deposited in a middle zone, where the influence of the opposing circulation is less strongly felt" (2). For our purpose, it is sufficient to bear in mind the preponderance of arterial pressure over venous. Orth says (5) the communication between the hepatic artery and portal vein takes place in the intralobular portal vein radicles, so it is easily comprehensible that any closure of these intralobular radicles will make any vicarious entrance of hepatic arterial blood supply impossible, con-

sequently the closure of the smallest branch of portal vein will cause atrophy and even complete necrosis of the corresponding area of liver tissue. The point I wish to make is that the commingling between the hepatic artery and portal vein is established through the medium of a tremendously ramified and interposed capillary system (Eingeschaltenen Kapillar System) and in consequence of which the circulation of the liver is very much retarded. In the case reported below, the severance of the left hepatic artery shut off the blood supply of the left lobe of the liver completely. The effect was two-fold, locally death to the entire lobe, since the hepatic artery is the nutrient vessel, and secondly, since the hæmorrhage was tremendous, a lowering of the blood pressure sufficient to cause a voluntary arrest of the hæmorrhage, yet was not sufficiently profuse to drain off enough blood to cause death. The hæmorrhage from the parenchyma of the liver, though probably great, was arrested by the lowered blood pressure due to the arterial hæmorrhage from the left hepatic artery, facilitated a priori by the lower blood pressure of the portal vein and hepatic vein. The anastomotic interchange of blood between the portal vein and hepatic vein would undoubtedly have led to a fatal termination, had both or either been severed, due to the close proximity of the vena cava; besides, the sparse supply of connective tissue and relatively poor supply of elastic fibers in the liver would have favored hæmorrhage in spite of the lowered blood pressure. Hence since the anastomosis occurs from the hepatic artery to the portal vein, and never in the reverse, and since the hepatic artery is a small vessel, and since the circulation in the liver is normally very much retarded, and since the veins are devoid of contractible tissue, this is what happened. After rupture of the hepatic artery, the left lobe was drained and was no longer nourished. The blood pressure was reduced, causing an arrest in hæmorrhage and a stasis at the areas of commingling with the hepatic artery and portal vein. This stasis led to the formation of thrombi in the radicles of the portal vein and hepatic vein. Severe traumatism may by producing rupture of the liver cut off the vascular supply to a part or parts of liver. If life is prolonged for some days, the areas of the liver thus deprived of the blood supply present to the naked eye an appearance resembling an anemic infarct. The areas are firm, white in color, and have been regarded as infarcts by Klebs and others. Microscopic examination shows that there is moderate necrosis in these areas (2). Ligation of the sound arteria hepatica propria is followed by total necrosis of the liver, causing death, proven experimentally (3). Post-traumatic appearance of the areas of the liver is frequently described as being due to anemic infarct. I believe it is due to a depletion of blood from the affected part, plus the formation of infarcts. The arterial hæmorrhage drains the affected part completely, and if sufficiently profuse causes death; if death does not ensue the blood pressure is so reduced as to cause stasis in the capillary ramification, with subsequent plugging of the radicles of the portal vein and hepatic vein.

CLINICAL HISTORY OF CASE

A boy nine years old was struck by an automobile March 11, 1908, while playing in the street. He was unconscious, but regained consciousness in a few minutes, and on examination was found to have bruises over the right hip and right side of face. On admission to the hospital, within half an hour after the accident, his temperature was 99°, pulse, 80, respiration, 26, which condition remained practically uniform during the following four days. His injuries were regarded slight, and he was detained at the hospital for observation. He slept well during the first night, during the next day he vomited, a bilious vomit, four times, and at intervals complained of sharp pain in the abdomen. The abdomen was flat, easily palpated, soft, slightly tender all over, no localized tenderness. The patient was drowsy, irritable when disturbed, and preferred to lie on his left side. During the second night, patient was noisy and restless, during the third day he vomited once, a large amount of grayish brown fluid, drowsiness and irritability continued, abdominal palpation was painful, though abdomen was soft and there was localized tenderness on pressure over the left iliac region. This was the condition of symptoms until the afternoon of the fourth day, when his irritability and restlessness became pronounced, and his temperature was 98° (the lowest since the accident, though the highest was only 100°) pulse, 118, respiration, 36 (previously, practically stationary at 100 and 22, respectively). It was decided to operate at once, and since the pain was more pronounced over the left iliac region, that region was explored first. The abdomen was full of dark blood, and as the cause of hæmorrhage was not revealed, the search was continued upward on the left side; spleen



Gross specimen of liver slough.

was intact. The incision was enlarged well upward, so as to expose the liver and there the lesion became apparent, a rent of three inches between the right and left lobes, close to the round ligament on the side of the left lobe. The left lobe was blanched completely and looked yellow, giving the right lobe a congested appearance by contrast, although normal in color; all bleeding had stopped, all free blood was carefully sponged out, gauze drain carried to the ruptured portion of the liver, and the abdomen closed, allowing the drain to protrude. The patient did well, with a temperature not above 101° for the next ten days after operation, on this day he was allowed solid food for the first time (creamed chicken), and his temperature shot up to 104.5° (pulse, 134, respiration, 32) previously maximum 101°, 120, 28. Liquid food was adhered to, and mean daily range of pulse remained 88-102 and of temperature 99°-101°. The discharge was very profuse and purulent. Dressing was changed daily. While changing the dressing April 24th, 35 days after operation, there protruded from the wound, sloughed tissue drenched in pus. In endeavoring to remove this by means of forceps, the pain was referred to the spinal column, and was so intense that an anæsthetic had to be administered, then by pulling upon the protruding parts, and twisting it, it dislodged easily. On examination of the tissue, by Dr. H. S. Martland, the pathologist to the hospital, it proved to be composed of necrosed parenchyma, held in the meshes of perilobular connective tissue. Remnants of perilobular bile ducts, portal vein, and hepatic artery radicles were still discernible. The tissue in all probability represented the larger part of necrosed left lobe of the liver (See Fig. 1).

The cavity healed readily after removal of the slough, and the patient was discharged cured May 7, 1908, 84 days after the injury. He is well at date of this report.

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SURGERY OF THE THORAX

Intratracheal Insufflation by the Method of Meltzer and Auer

By WILLIAM C. QUINBY, M. D., Boston, Massachusetts
From the Laboratory of Surgical Research of the Harvard Medical School

MOST encouraging for the future development of the surgery of the thorax is the large amount of work in this department, both clinical and experimental, which is being done on all sides, reports of which are appearing in the literature with steadily increasing frequency. It is indeed certain with the present rate of progress, that in the near future surgical operations within the chest will be as usual and well understood as are those within the abdomen to-day.

Successful entrance to the thorax depends in a very large measure on our present ability to make harmless that old surgical dilemma, an acute pneumothorax, and this has been brought about by the splendid work of Sauerbruch, whose idea, as embodied in his negative pressure chamber, was published in 1904. This was soon followed by the adoption of positive pressure by Brauer, until at present the various devices for the prevention of the collapse of the lung are numerous. In general they may be divided into four groups: negative or positive pressure chambers; positive pressure cabinets; positive pressure masks; intralaryngeal and intratracheal tubes. In all these appliances the aim has been by one method or another, to prevent collapse of the lung when the thorax is opened, and thus to maintain proper oxygenation of the blood. Some of these appliances such as the negative pressure chambers of Sauerbruch and Meyer are large, costly, and not designed for transportation. Others, though easily moved, such as the smaller positive pressure cabinets and masks, do not place the patient under such safe conditions as do the larger contrivances. All, however, are based on the two physiological principles that the air pressure within the lungs is greater than on their surfaces, and that the respiratory exchange is maintained by an inspiratory current carrying in oxygen, alternating with an expiratory current carrying out carbon dioxide. This is the usual type of breathing throughout life. It is termed by the physiologists *external respiration*, to distinguish it from the exchange of gases which takes place between the carbon dioxide of the tissues and the oxygen of the blood, flowing continuously through a capillary, which is called *internal respiration.*

Until the very important observation of Meltzer and Auer, which appeared last year (2), it was not recognized by physiologists that for this to and fro type of external respiration there could be substituted a type of internal respiration, with continuous flow of air over the alveoli, in which, under certain circumstances, the usual respiratory movements might be absent. The thorax could be widely opened, the animal thoroughly curarized, and still its life be as safe and its blood as perfectly oxygenated as with the usual to and fro breathing. This was accomplished by introducing the air through a tube reaching nearly to the bifurcation of the trachea, and of such size as to leave sufficient space between the wall of the tube and that of the trachea for egress of the air carrying off carbon dioxide. Here, then, we have a device for eliminating the dangers of pneumothorax which is based on a new physiological principle, and which is simple in the extreme, needing but a source of air delivered by a soft rubber tube to the bifurcation of the trachea.

This method of artificial respiration, which Meltzer calls intratracheal insufflation, is not without its opponents, however. Objections have been raised to it on various scores. To some, familiar with the complicated cabinets ingeniously devised, and costing several hundreds of dollars, it seemed too simple a method. To others less prejudiced, though granting that the method did all claimed for it in the case of animals, it has seemed for one reason or another impracticable to apply it to the human being. Inasmuch as it is of the greatest importance that this new physiological principle be thor-

oughly tried out, the present paper is written as a critical resumé of the method based on the writer's experimental results (3), as well as a discussion of any pertinent objections which have been made to it.

I cannot do better in describing the method than to quote Meltzer verbatim (4).

When through an opening in the trachea a tube of a diameter which is distinctly smaller than the lumen of the trachea, is introduced so as to have the lower end reach the bifurcation, or resting loosely even within the upper end of one bronchus, a stream of plain air, sent continuously through this tube, will keep up the life of even a completely curarized animal. The pressure by which the air is driven need not be more than 10 or 12 millimeters of mercury. The chief requirement for the success is that the lower end of the tube should reach the bifurcation. When the tube does not reach deeper than the usual tracheal cannula, the curarized animal dies in a short time. The deeper the tube reaches, the longer does the animal live; but the complete success can be attained only when the tube reaches the bifurcation or reaches a bronchus. Another requirement is that the tube should fill out about two-thirds of the lumen of the trachea; when it is wider, there is not enough space between the tube and the tracheal wall for the return of the air carrying the carbon dioxide, and when it is too narrow, there seems to be not enough supply of the air conveying the oxygen. We had dogs which under this system of ventilation were for four hours and longer under the influence of curare and recovered, either by getting out spontaneously from the influence of curare, or by the use of physostigmine, which is a pretty good antagonist to curare. Similar successes we had when the tube was introduced through the mouth and larynx into the trachea; but on account of the greater narrowness of the larynx it is more difficult to adjust the diameter of the tube to that of the lumen of the larynx.

In non-curarized animals the continuous intratracheal insufflation of air under a moderate pressure reduces the voluntary respirations of the animal to eight or six times per minute. With an increase of the pressure to 20 or 25 millimeters mercury a complete apnœa may be obtained. . . . When the thorax is widely opened, the lungs are found more or less distended, of pink color and completely quiet, while the heart is beating efficiently and regularly.

The fact that the success of the method of the intratracheal insufflation is the more assured the deeper the tube is in the trachea, indicates that the favorable factor in this method of ventilation is to be found in the circumstance that it cuts out the largest part of the dead space. The oxygen-carrying pure air reaches the upper end of the bronchi continuously, and under a pressure and with a velocity which are greater than normal, and removes from there any accumulated carbon dioxide also continuously, and with a pressure and a velocity again greater than normal. The exchange of the gases within the bronchi and the alveoli occurs probably essentially by diffusion. . . .

In experiments in which the tube did not seem to be well adjusted and the color of the lungs as well as the action of the heart indicated the imminent danger of asphyxia, it was found that the interruption of the air stream for a second or two would avert the danger. . . .

Apparently the momentary collapse and distension assist greatly in the exchange of the gases within the bronchi and alveoli.

Meltzer demonstrated further that when the mouth of the animal was filled with vomitus or with a suspension of charcoal in water, the force of the returning air current was sufficient to prevent these substances from entering the trachea. It was further shown that animals come under the influence of the anæsthetic and recover from it within a much shorter time than by any other method of anæsthesia; and so perfect is the ventilation that it has been impossible to kill an animal by forcing the ether. Still more important is the fact that after killing the animal with ether applied by a cone, insufflation was able to resuscitate him after the heart had stopped for fifteen or twenty-one minutes.

EXPERIMENTAL DATA, AND CONCLUSIONS DRAWN FROM THEM

During the past spring and summer experimental work has been carried out in the Surgical Research Laboratory of the Harvard Medical School. Pneumectomies and esophageal sutures, as well as physiological observations, were made on some thirty dogs. All animals were anæsthetized with ether by a cone before the introduction of the trachea-tube. Morphia was not used in the physiologl ical experiments. The apparatus used in each operation was that described by Meltzer, namely, a foot bellows connected by rubber tubing with a Wolff bottle containing ether, and fitted with a by-pass and with a mercury manometer. No attempt was made either to filter or to heat the air. The tracings were made with a membrane manometer which was frequently calibrated with a mercury column, and the scale thus obtained used to calculate the height of the blood pressure.

Respiration. No attempt was made to obtain graphic records of the respiratory movements, since their presence or absence

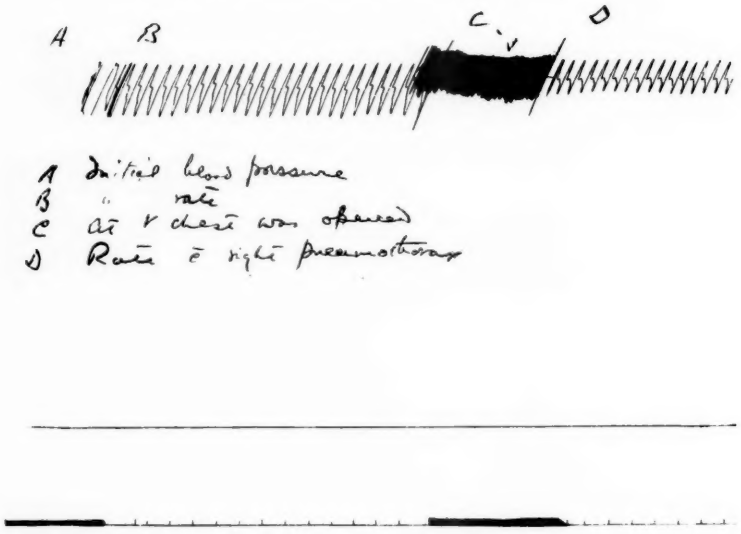

Fig. 1.

has no influence on the proper gas exchange within the lungs. As a matter of fact, respiratory movements are usually present, though markedly decreased in frequency and depth. The approximate fall in rate in a number of observations was from thirty-five or forty at completion of etherization with cone, to ten or twelve after the introduction of the tube and entrance to the chest on one side. In general, their presence or absence depends on the degree of anæsthesia and on the degree of distension of the lungs. The deeper the etherization and the greater the speed with which the air passes from the tube into the primary bronchi, the fewer and more shallow are the movements of chest wall and diaphragm till a point is reached at which they cease. In the observation of Meltzer on the curarized dog noted above, respiratory movements were of course absent over a period of several hours, till with the gradual excretion of the curare, they returned. On the other hand, deep, agonal respiratory movements always indicate a marked disproportion between the size of the tube and that of the trachea, and call for an immediate withdrawal of the tube and the substitution of one of a more nearly correct size.

Heart. The regularity of the heart beat has never been observed to be altered. Its force and rate are dependent mainly on the proper oxygenation of the blood. If the tube is too large, so that the carbon dioxide is not removed with sufficient speed, there occurs a slight dusky tinge of lung and tongue. In time this leads to gradual, moderate dilatation of the right ventricle. Careful watch should be kept of the color, and a slight cyanosis should be met by a more active æration through the tube, together with a few quickly performed *deflations* through the lateral outlet. Anything more than slight cyanosis should call for the substitution of a smaller tube.

Blood pressure. Tracings made of the peripheral blood pressure show that it remains uninfluenced by the intratracheal insufflation as such. As in any surgical operation it is dependent on the amount of anæsthetic, the duration of the operation, the loss of heat, and the amount of trauma inflicted. In those observations which lasted from two and one-half to four hours, the blood pressure at the end of the experiment was sometimes unaltered. The highest rise noted was 16 per cent, while the greatest fall was 21.4 per cent. The following are two typical protocols.

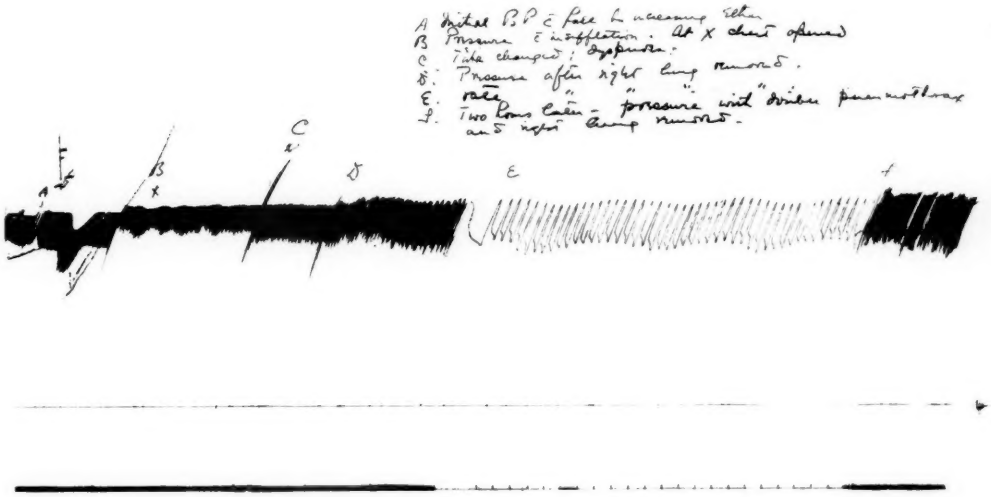
A Initial B.P. & Rate in unconscious Ether
B Pressure & insufflation; At X chest opened
C Tube changed; Dyspnoea.
D. Pressure after right lung removed.
E. rate " " "
F. Two hours later - pressure with double pneumothorax and R. lung removed.
A
B
C
D
E
F

Fig. 2.

May 13, 1910. Boston terrier, wt. 7 kg. Etherized first with cone and then insufflation. Cannula arranged in right femoral artery. Initial blood pressure recorded; rate recorded. (See Fig. 1.) Chest wall dissected, and right thorax entered. Pneumothorax allowed to persist for a half hour, and then blood pressure and rate again recorded. Animal killed two hours later, with blood pressure still well within normal limits. Autopsy showed the tube to rest 1.5 cm. above the bifurcation. The trachea was of normal appearance and free from excess of mucus. At the level of the entrance to the thorax it measured 1.4 cm. in diameter. Dimensions of tube: diameter 7 mm., lumen 5 mm., length to upper incisors 27 cm. Average air pressure, about 10 mm. Hg.

Calculations from tracing: Initial blood pressure, 150 mm. Hg. Initial rate, 18 beats per ten seconds. Blood pressure after one-half hour pneumothorax, 155 mm. Hg.; rate 20.

May 17, 1910. Brindle mongrel, wt. 9.6 kg. Ether; insufflation; cannula in right femoral artery. Experiment began at 9:35 A. M.; ended at 1:20 P. M. On opening chest the tube was found to be too small (7 mm. diam., lumen 5 mm.) so it was withdrawn and one of 9 mm., lumen 6 mm. was substituted. During this exchange the dog made some half dozen voluntary respiratory movements of dyspnœic type. Right lung removed. (See Fig. 2.) Mediastinum torn so as to produce double pneumothorax. For the following two hours various experiments were done by one of the laboratory workers, on the neck and abdomen, at the end of which time the animal was bled to death, after making a final tracing. Autopsy showed the trachea dry; the remaining lung normal. End of tube 1.8 cm. above the bifurcation. Length of tube to upper incisors, 35.5 cm. Diam. trachea at entrance to thorax, 1.5 cm.

Calculations from tracing: Initial blood pressure 90 mm. Hg., final pressure 100 mm. Hg. Rate after removal of right lung, 20 per ten seconds.

The pressure in the pulmonary circulation was also measured. In each instance it remained practically unaltered with any degree of distension or collapse of the lungs compatible with proper oxygenation of the animal. Marked overdistension caused the pulmonary pressure to increase slightly, as did also marked collapse. These findings are in accord with those of Dreyer (5), who found that the curve from the pulmonary artery showed no change in form, rhythm, or height, in spite of variations in positive pressure.

Vagus reflexes. Since stimulation of the larynx calls forth violent coughing reflexes, this must be made anæsthetic before the introduction of the tube. This may be accomplished either by the application of cocain to it, or by deep general anæsthesia. Another place where a cough reflex may be set up is at the bifurcation of the trachea. Withdrawal of the tube for a half inch or so will always prevent its continuance. I have several times noted this reflex cough from pressure at the bifurcation in dogs, and read with interest that it also

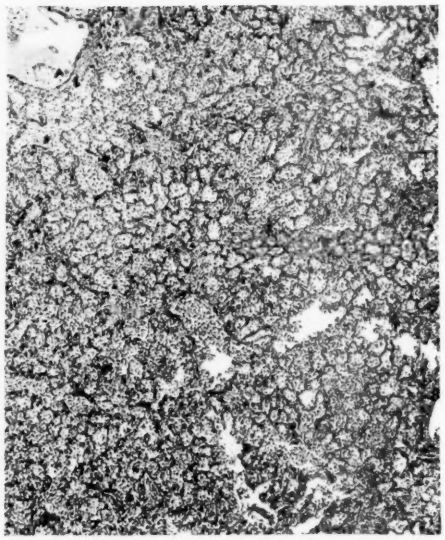

Fig. 3. Pneumonia caused by using septic tracheal tube.

occurs in man (6). Just as in the dog, so in the human being, it quickly disappeared on slight withdrawal of the tube.

That serious cardiac inhibition may be caused by stimulation of the cardiac vagus while introducing or using the tube, has been feared by some. One need only note the large numbers of successful operations through the metal tubes of the bronchoscopists to know that this danger is very slight. It cannot be denied, however, that such vagus inhibition may occur, and for this reason, in every case where the insufflation method is used for the human being, a dose of atropin (grains 1-60 or 1-50) should be given before introducing the tube. This may be repeated at any time during the operation if it should seem necessary. The action of atropin is to paralyze the cardiac vagus, and so any dangerous slowing of the heart beat from this cause is entirely prevented. I have met with this inhibition once only in the dog, during the introduction of the tube while the animal was just barely under primary anæsthesia. The heart action returned to its normal rate immediately after the administration of atropin.

Condition of glottis and trachea after use of tube. No evidence of trauma to the vocal cords or trachea has ever been observed, either at immediate autopsy or at a later date. Dogs howl while recovering from ether, and afterwards, with quite their accustomed power, and in the human cases of Elsberg it was especially noted that no change in voice or tracheal soreness was present. Oversecretion of mucus has never been observed, either during or after the use of the tube. On the contrary, the trachea at immediate postmortem is found dry and clean. In a human case of Elsberg (7), "As soon as the insufflation was begun, the patient who had been struggling and coughing, his pharynx filled with mucus, became quiet, and the rattling of mucus in the pharynx and trachea disappeared."

Bacterial infection. It has been claimed that dogs are more resistant to the invasion of bacteria causing tracheitis, bronchitis, and pneumonia, than the human being, and that the probable occurrence of such would make the use of a tracheal tube in man a highly dangerous procedure. That the dog's air passages show such increased resistance may be true, if one argues from the behavior of their skin and peritoneum toward pus-producing organisms. That they are immune to respiratory tract infections is far from true, however. Indeed, in the form known as "distemper" they are quite prone to them. That true pneumonia may be caused in dogs has been recently shown by Meltzer (8).

In one of my experiments a tracheal tube was used which was known to be definitely septic. A right pneumectomy was done, the animal dying on the third day after. At autopsy the right thoracic cavity was found free from infection or fluid, and the bronchus air tight by forced pressure under water. The lower lobe of the left lung was consolidated and of a deep purplish color. Microscopical examination showed a beginning consolidation. (See Fig. 3.) Such an occurrence has never been observed in any other of the experimental animals when a sterile tube was used.

We have no reason to believe from any evidence obtained from animals that infections of the respiratory tract will occur in man. In the only two instances known to the writer in which the tracheal insufflation has been used for the human, *in which there was no infectious element present before its use*, not the slightest

indication of pneumonia, bronchitis, or tracheitis was seen.

The question of injury to trachea and lungs as a consequence of insufflation is, however, one which will not be settled with absolute conclusiveness until sufficient applications of the method have been made in the human being. Thus far, the only competent evidence which we have on this point all goes to show that none such occurs. By filtering the air current the introduction of any new bacteria is prevented (9). Harm can only come, by some trauma caused by the tube serving as a point of least resistance for bacteria already present. None such has thus far been observed, either in animals or in man.

It seems sure that the trachea is in reality much more tolerant than it has been formerly considered to be. Certainly during the course of a human life the tracheal mucosa is exposed to a variety of traumata hardly experienced by any other mucous surface of the body, except that of the mouth and nose. The temperature of the air currents passing into the lungs, their speed, their gas tension, their content of all sorts and kinds of dust and bacteria, as well as of water vapor, are of infinite variety and constantly changing. In proportion to this, ill effects such as bronchitis and pneumonia are very rare indeed; the body is safeguarded against them. It is true that nature did not intend the trachea to hold such a foreign body as a rubber tube; neither did she plan the urethra to tolerate a catheter. But surgery has demonstrated the latter possible and harmless, and that this same result will be found true of the insufflation tube with its air current, I am sure.

CONDITION OF THE LUNGS FOLLOWING INSUFFLATION

It has been objected that the insufflation method might cause capillary hæmorrhages or an interstitial emphysema of the lungs. Neither of these occurrences has been noted by the writer in any of the lung specimens examined microscopically, even when an attempt has been made to obliterate the space remaining after a total pneumectomy by overdistension of the remaining lung. (Figs. 4 and 5.) The truth is that neither hæmorrhage nor emphysema occur after the use of any reasonable pressure. This is an observation already made by others who have worked with positive pressure appliances. In the dog with its lax mediastinum, pressure sufficient to overdistend one remaining lung so as nearly to fill the whole thorax is not a pressure sufficient to cause an emphysema. In the human being having a more fixed mediastinum, this may not be possible, but in any event the question of emphysema and capillary hæmorrhage is one which has equal application to either the positive or negative pressure methods, as well as to that of intratracheal insufflation.

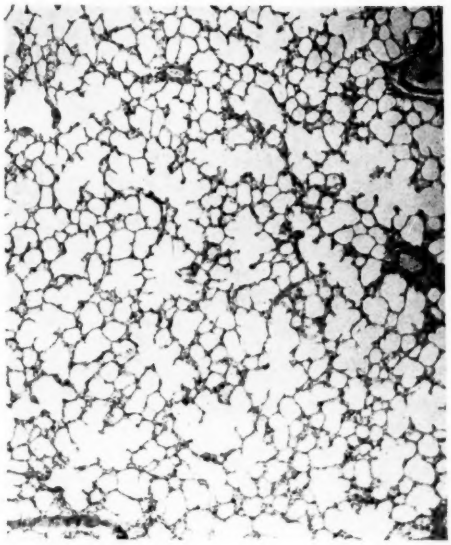

Fig. 4. Normal lung of dog. × 70.

ADVANTAGES OF THE METHOD OF INTRATRACHEAL INSUFFLATION

The advantages of intratracheal insufflation over all other methods of overcoming the dangers of an acute pneumothorax are marked. The most important advantage is that, in contradistinction to all other methods yet used, it is the only one in which the proper oxygenation of the blood is carried on independently of any respiratory effort on the part of the patient. With it, the usual type of external respiration is converted into the internal type. In all the positive and negative pressure contrivances

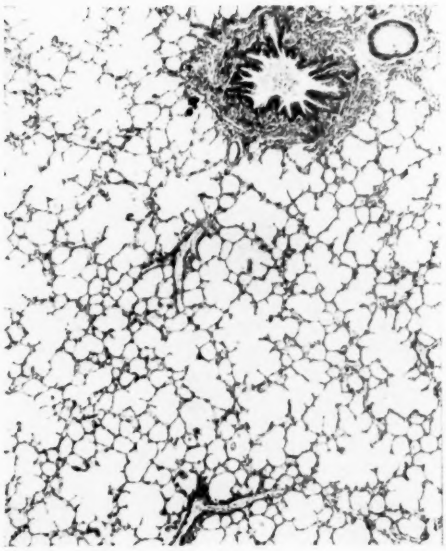

Fig. 5. Lung of dog after two hours insufflation. × 70. Compare size of alveolar spaces with those of normal lung shown in Fig. 4.

expiration takes place at a disadvantage. The patient must expire against an abnormally high air pressure. Both the forms of differential pressure have been shown to be practically identical in their physiological action (10). The barometric pressure in each which obtains on the surface of the lungs is less than that within their air spaces.

Whether expiration be performed by the diaphragm and chest wall, or by the elasticity of the pulmonary tissue alone, it must of necessity work against this difference in pressures. This means that an increased amount of work is thrown on the right heart which must compensate. In some instances dilatation has occurred. Together with this, there is a definite tendency for carbon dioxide to remain too long in the alveolar spaces to the exclusion of the better oxygenated air. Though this piling up of carbon dioxide is slight, to be sure, in the course of a two-hour operation it cannot fail to have a poisoning effect on the heart wall. That the human lung and heart can thus work at a disadvantage for varying periods of time, abundant operations under all the various forms of differential pressure apparatus have proved conclusively. But there is a limit of safety beyond which even the well heart cannot be pushed, and though it cannot be measured, this limit is a very definite one. In one instance workers with pressure cabinets have already recognized that for safety their apparatus must be provided with a valve mechanism which will permit the expiration to take place at a lower pressure than that obtaining during inspiration. Janeway and Green (11), in their cabinet, by the use of a valve operated by a cam, make possible "a true artificial respiration independent of the efforts of the patient." Meyer, who has been the bitterest opponent of the Meltzer-Auer insufflation method (12), now advocates the very procedure which he formerly criticized, namely, occasional deflation of the lungs to get rid of the increase of carbon dioxide. He says (13), "In differential-pressure operations CO_2 retention also seems to occur. . . . The so-called shock in these cases is evidently partly due to an accumulation of carbon dioxide in the blood. In an exploratory thoracotomy of short duration such retention of the noxious gas is not sufficient to do injury. But in the longer operations, for instance the resection of the œsophagus, the greater CO_2 accumulation, and the added effect of the necessary blunt handling of the network of the pneumogastrics, both acting cumulatively in the same direction, is too great a strain upon the heart, and it gives out. This has been my observation also in the two cases of partial pneumectomy, above cited. When ligating the many vessels along the bronchus, undoubtedly one or more branches of the pneumogastric of the lobe of the lung became included in the ligature. Everything having gone fairly well up to that moment, a sudden turn occurred; the heart, already weakened by the slowly increasing cumulative action of the carbon dioxide, received its death-blow through the added nerve reflexes.

"A very important conclusion can be drawn from these experiences. It is necessary in the course of thoracic operations of long duration to interrupt now and then the pressure, allowing the lungs to collapse."

Such necessary pressure changes are much better provided for by the apparatus of Janeway

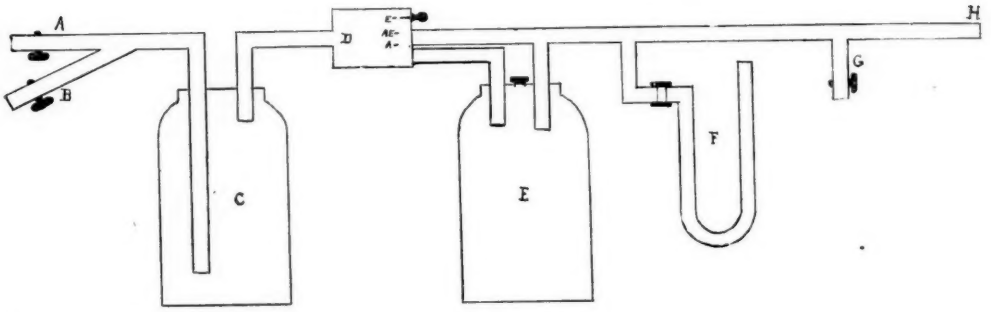

Fig. 6. Schematic drawing of apparatus for use in human being. A and B, Inlets for air pump and bellows. C, Bottle for warm water to heat and moisten air. D, Valve chamber containing cotton for filtration of air and slide valve to control direction of air current. E, Bottle for ether. F, Mercury manometer. G, Lateral outlet with stop-cock, for deflation. H, End of tubing connected with rubber tubing going to tracheal tube.

and Green with its small volume of contained air, than in the large cabinet of Meyer, dealing with a much larger cubic content. Even more perfect in this respect is the insufflation method, the side exhaust giving immediate control over a quantity of air amounting only to that contained in the partially collapsed lungs.

Another advantage of intratracheal insufflation is that with it the æration is so complete that less ether is used than by other methods, so that recovery from the anæsthetic is rapid. This is a very constant and striking observation in animal experimentation, and has also been noted by Elsberg in man (14). Furthermore, Meltzer has found it impossible in a well dog to give sufficient ether to kill the animal. Using the constant air current in the laboratory, he has kept a dog under anæsthesia through the intratracheal tube for twelve hours, no attention being paid to the animal during all this time except to see that there was sufficient ether in the Wolff bottle (15).

This perfect æration and entire independence of any respiratory movements on the part of the patient, are the two important and vital advantages. Another advantage is that the gullet is left free for instrumentation. Besides this, the much decreased number of respiratory movements, as well as the lessened size of the lung, make all operations in the depths of the thorax much easier than they would be otherwise. That forced, agonal respiratory movements may seriously interfere with the technique of a delicate operation may be seen in the protocols of Tiegel (16). In nine out of twenty-one experiments such forced breathing ("Pressatmung") is mentioned, in some instances being so great as seriously to interfere with the suture of a bronchus. His positive pressure mask was the apparatus used (17). The simplicity of the insufflation apparatus, its low cost and ready transportability, are also important points in its favor.

CLINICAL APPLICATION

In using the insufflation method for the human being the air should be filtered and warmed. Also the apparatus by which the method is conducted should be as reliable and permanent as possible. The apparatus first devised by Elsberg (18) was unnecessarily complicated and bulky. I have had the following simple arrangement constructed for me by Codman & Shurtleff of Boston. (Fig. 6.)

The source of air is two-fold; either the usual foot-bellows such as has been used in all the laboratory experiments, or a blower driven by a small electric motor. Whenever electricity is available it will be easier to use the motor, but should the current fail for any reason, the bellows can be immediately substituted. The air first goes through an insulated bottle containing warm water, after which it reaches the valve box which is loosely filled with sterile cotton acting as a filter. It is better to use non-absorbent cotton. By the lever on the side of the valve box the air stream is now continued straight on to the tracheal tube, or

portions of it or all of it may be deflected into and through the second bottle containing ether. A manometer and lateral outlet for deflation complete the apparatus.

The tracheal tubes are of soft rubber, with perfectly smooth surface free from seams, about 15 inches (38 cm.) long, with finished end like a stomach tube. Their wall is of a uniform thickness of 1 mm., and for convenience in judging the length of tube which one is using they should be marked in centimeters from 15 to 30. One tube for each millimeter increase of size should be on hand, from 5 mm. up to and including 10 mm.

Before introducing the tube the following few anatomical points should be borne in mind. The surface landmark of the bifurcation of the trachea is the second rib in adults. In infants it is slightly higher than this, while in those past middle age it gradually becomes as low as the third rib. In the adult the glottis is just about half the distance between the upper incisors and the bifurcation. In children the trachea itself is relatively shorter. This distance from upper incisors to bifurcation varies from 23 or 26 cm. (9 or 10 inches) in the adult, to 17 cm. in the child, and 12 cm. in the infant.

Introduction of tube. The size of the trachea should be estimated above the sternal notch and a tube chosen which is about half this size or a little larger. After a hypodermic of morphin and atropin, the patient should be etherized in the usual way. Under full surgical anæsthesia in the Rose position, the mouth gag is inserted and the pharynx and larynx painted with 10 per cent cocain. The sterile tracheal tube is now introduced, either by a laryngeal forceps, the epiglottis being held forward by the operator's left forefinger, or by the use of a Killian speculum. After passing the glottis, it is pushed forward till a resistance is felt, or until 26 cm. have been introduced as measured against the upper incisors. It should then be withdrawn about 2 cm., so as to lie just above the bifurcation, and then connected with the rest of the apparatus. When it is correctly placed, air can be heard to enter both lungs on auscultation. A clip on the mouth gag holds the tube firmly at the desired point.

CONCLUSION

In summing up we see that once again, as so often in the past, surgery is indebted to the physiological laboratory for advance. By the intratracheal insufflation method of Meltzer and Auer we can now create a situation corresponding to that of internal respiration in which the dangers of pneumothorax are entirely overcome. It is the simplest method known which will "breathe for the patient." Other methods have allowed carbon dioxide slowly to accumulate in the air passages, and finally endanger the heart. By this new method it is very hard or even impossible to give sufficient ether to kill. Its only disadvantage is the necessity of intubation of the trachea, with possible danger of pneumonia from this source. The evidence which we have thus far tends to show that this danger has been much overestimated. In none of the cases where the method has been applied to man has bronchitis or pneumonia occurred.

Insofar as my experimental observations go they entirely confirm the much greater experience of Meltzer, Carrel, and Elsberg, who find that the method of intratracheal insufflation is very safe, and rests on a firm physiological basis. In some thirty observations, some of them as long as four hours, others during such severe operations as total right pneumectomy and esophageal sutures, I have never had a death due to the method of anæsthesia. With such an apparatus as that described above, about as easily carried as the usual Bennett inhaler kit, every surgeon has at his command an arrangement for making operative pneumothorax harmless. Of moderate price, easily transportable and safe, it should make operations on the thoracic contents common, and done by many surgeons, instead of as to-day, by only a few. Further than this, it places at his command an apparatus which will "breathe for the patient" in case of respiratory failure from many other causes than acute pneumothorax. Already it has been used with success in cases of myasthenia gravis, severe opium poisoning, and cessation of respiration from brain abscess, as well as in the operative cases. It is the writer's hope that many surgeons will familiarize themselves with the principle underlying this method, as it is one which will

undoubtedly be of great value in the development of thoracic surgery.

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1. The first of a series of papers on the Surgery of the Thorax, the experimental portion of which has been done under a grant from the Department of Surgical Research in the Harvard Medical School. To the directors of this department the writer here expresses his best thanks for their unfailing courtesy and encouragement. I wish also to acknowledge my indebtedness to Dr. S. J. Meltzer of New York, for his many kind suggestions; as well as to Dr. C. A. Elsberg, also of New York. To Dr. G. W. Morse of Boston, are due my thanks for his able and skilful assistance at the operations.
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15. Personal communication.
16. "Experimentelle Studien ueber die Chirurgie des Bronchus." Beit. z. klin. Chir., 1910, bd. lxvi, h. 2, s. 407.
17. The great difficulties of operating with the distended lung of the positive pressure system have led Tiegel in his most recent communication to adopt what is practically the Volhard method, with a short tracheal tube and oxygen, thus allowing the lungs to collapse. Cf. "Weitere Mitteilungen ueber Ueberdrucknarkose." Beit. z. klin. Chir., 1910, lxviii, h. 2, s. 584.
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A NEW OIL IN THE TREATMENT OF POSTOPERATIVE ABDOMINAL ADHESIONS

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SINCE the advent of the era of abdominal surgery, the two most serious postoperative complications have been sepsis and intraperitoneal adhesions. With the aid of antiseptics, and later by the perfection of an aseptic technique, the first most dreaded condition, sepsis, has been reduced to a very great degree, usually commensurate with the skill of the surgeon and his attention to detail.

How best to minimize the formation of postoperative peritoneal adhesions is the question, which, above all others, is at the present time occupying the surgical mind and taxing the ingenuity of its many operators. Many different methods of procedure, with this end in view, have become fixed rules in operative technique and postoperative treatment.

That the problem is still far from solution is most forcibly evidenced by the fact that nearly every issue of our surgical journals contains some new article along this line.

During the past three and a half years profiting by an experience with the use of sterile olive oil poured freely into the abdominal cavity, recorded by Dr. J. M. Lee, of Rochester, we have introduced sterile oil into over two hundred abdomens. In the great majority of these cases, olive oil was the one employed. Many grades and kinds have been used by us,

owing to the fact that they had frequently to be obtained and prepared on the spur of the moment.

As a result of the use of olive oil in this series of cases, certain definite conclusions have been reached: A number of these we mentioned in a paper read before the New York State Society in February, 1909. The deductions regarding the intraperitoneal use of olive oil up to that time (forty-seven cases) were as follows:

It is readily obtainable.

It is not a good culture media.

It is easily sterilized.

It is slow in absorption, thus permittting tissue repair ere it is taken up by the system.

It furnishes an admirable substitute for the removed abdominal fluid.

It prevents friction of sensitive and inflamed areas, thus lessening postoperative pain.

It facilitates early peristalsis, thus preventing bowel stasis with its dangerous sequelæ.

But above all, it does prevent postoperative peritoneal agglutinations, which are so prone to terminate in these dreaded adhesions.

After a careful study of the subsequent history of these oil cases, together with additional experience derived from its use in further cases, various points in which olive oil failed to fulfill all the requirements of a perfect menstruum gradually evolved. It was noted that normal surgical reaction was frequently more marked than in similar cases in which oil was not used. In a few cases, the oil seemed to fail in the prevention of postoperative adhesion (in two cases which had subsequently to be re-operated, and a number of adhesions were found in each case); but, on the whole, it has been so gratifying in its minimization of the postoperative sequelæ, especially adhesions, that we have come to believe that its use has marked a decided advance in surgery. In the various hospitals in which we operate, different brands of the oil were used and the resulting postoperative phenomena differed so widely that we began to investigate further the properties of various olive oils on the market. Much to our surprise, we found olive oil a widely differing and unstable compound. We ascertained that the number of brands runs up into four figures, there being at least three hundred brands of Italian oil alone. There are also Californian, Syrian, Portuguese and so-called European, brands, etc.

It had been learned from experience in dropping olive oil into the eye and by the effects of some olive oils on serous membranes, that nearly all olive oils were acid in reaction; so we took up the chemistry of olive oil and ascertained that all olive oils contain a greater or less per cent of free fatty acids. From a series of 232 samples analyzed, it was found that these contained free fatty acids differing in amount in the various kinds of oil anywhere from a little under one per cent to as high as twenty-five per cent in one case.

SAMPLES OF OLIVE OIL EXAMINED (LEUKOWITSCH)

Description	No. of Samples	Free Fatty Acids	Observer
	1	1.17%	Salkowski
	1	1.66%	Rechenberg
Commercial	49	Less than 5%	Archbutt
Commercial	66	5–10%	Archbutt
Commercial	44	10–15%	Archbutt
Commercial	1	20–25%	Archbutt
Commercial	11	3.86%–11.28%	Thomson and Ballantyne
Syrian	1	23.88%	Thomson and Ballantyne
Californian	3	1.55%–8.33%	Moercke
European	3	0.97%–1.09%	Moercke
Italian	18	0.57%–2.79%	Tolman and Munson
Californian	38	0.20%–3.51%	Tolman and Munson

Italian varieties are the best, and of these "Province oil" and "Aix oil" are considered the finest. The Portuguese oil is probably the poorest.

Five to ten per cent of free fatty acids is not uncommon. Many of the better oils are flavored and contain coloring matters. These objectionable substances found present in olive oil consist of: œnanthylic aldehyde, and formic, acetic, butyric, œnanthylic, azelaic and suberic acids. We thus found a most satisfactory explanation for the varying effects of the olive oils used in this series of cases. Recognizing these serious shortcomings, we began the search for a more ideal oil and preferably one of purely animal origin. Our experience with olive oil had led us to believe that oil is undoubtedly the best media thus

far discovered for the prevention of postoperative intraperitoneal adhesions. The problem, then, for solution was the ascertainment of the oil best suited for this use. The consideration of this subject led us to formulate the following requirements which should be possessed by an ideal oil:

1. It should be readily obtainable.
2. It should be neutral in reaction and thus non-irritating to serous membranes.
3. It should be non-toxic to the system.
4. It should be readily sterilized without material change in composition.
5. It should be highly lubricating and thus facilitate easy readjustment of the viscera and early peristalsis.
6. It should be slow in absorption, thus permitting of tissue repair ere it is taken up by the system.
7. It should be eventually metabolized and thus removed after it has acted out its part.
8. It should facilitate free drainage of the abdominal cavity.
9. It should inhibit bacterial growth or preferably be germicidal.
10. Above all, it should prevent postoperative peritoneal agglutinations and the formation of these dreaded adhesions.

In taking up the subject with a friend, one of our most eminent physicists, James C. Bayles, M. E., Ph. D., formerly president of the Board of Health of New York City, and a recognized authority on oils, we ascertained that we could procure an oil which *chemically* fulfilled to the highest degree our ideal in this respect. This we found in a pure animal oil extracted from the contained fat of the omentum and appendices epiploica of cattle. Through Dr. Bayles, we succeeded in getting several gallons of this oil prepared as follows:

The fresh layers of fat from the omentum and appendices epiploica (the so-called caul and ruffle) are taken from the animal within a few minutes of the time it is killed and before it is dressed. This is then washed thoroughly in cold water, which removes the enzymes and the blood. It is then hardened by refrigeration, cut into small pieces and macerated, after which it is placed in a jacketed vessel and melted at about 45° C. at which temperature the oil readily separates. The fibrin is then precipitated partly by gravity and simple chemical processes. The excess of stearine is then removed by cooling, which causes it to crystallize, after which it is separated by filtering out through ducking. The fatty acids are reduced to the least possible expression, about .25 per cent or less, and in no specimen are they more than .5 per cent. This purely animal oil is neutral in its reaction, stable in composition, reaches its highest degree of *liquefaction* and *lubrication* at *body temperature* and is approximately made up as follows: olean 60 per cent, stearine 20 per cent, palmitine 20 per cent, with the slightest trace of free fatty acid, this latter being formed principally through the action of the natural tissue enzymes which tend to break down the oils and the higher fatty acids. It is markedly bactericidal, as evidenced by the following report from Dr. Lindsley F. Cocheu, Teacher of Bacteriology in one of our New York colleges.

June 22, 1910.

Dear Doctor Crump: The following experiments have been carried out with specimen marked "Neutral Animal Oil" with the following results:

Liquefaction begins to take place at 28° C. and is complete at 37.5° C. (body temperature).

It is neutral in reaction.

Pure cultures of staphylococcus albus and of the streptococcus pyogenes were planted, using the oil as a medium. These tubes so used presented no growths upon them for the three months during which experiments were carried on. Control cultures planted at the same time upon agar gave luxuriant growths. Recultures were then made upon agar from the original oil plants, with no resulting growths after one week at incubator temperature (37.5°).

Tubes containing the oil were allowed to remain open in the laboratory for one month. They were then found to have no bacteria growing on them.

We have put this neutral animal oil, which my associate has dubbed "Sacred Oil," into forty odd abdomens in amounts varying from 100 to 2000 cc. When handled properly it would seem to fulfill to a large degree all the requirements of an ideal postoperative menstruum. In the greater number of these cases, adhesions were extensive and had to be broken up at the time of operation. In several cases pus, both sterile and infectious, was found free in the abdominal cavity.

The time allotted will permit only of our mentioning a few of these cases, so we have

selected four which we consider to be the most interesting:

CASE 1. Miss B., aged 46. Menopause two years previous, large uterine myomata weighing twenty-three pounds, with umbilical hernia size of a large grape fruit. On opening the abdomen it was found that the growth was everywhere adherent and had become largely parasitic onto four loops of small intestines and the omentum. In its removal, two one-half feet of small intestine had to be resected; free end-to-end anastomosis was done; very extensive raw areas which could not be covered by peritoneum were left. One pint of the oil was introduced before closing the abdominal cavity; high saline enema two quarts, warm, was given before leaving the operating table. Gas was passed within six hours, free bowel movement obtained at the end of twenty-four hours. Patient left the hospital at the end of three weeks and resumed her position, a laborious one, at the end of the fifth week.

CASE 2. Miss M., aged 51, single. Emaciated to an extreme degree, suffering from a large cystic papillary carcinomata of the left ovary, which extended up into the epigastrium. On opening the abdomen, it was found that the cyst had ruptured low down some time previously; cystic fluid and bits of pathological tissue were found free in the abdominal cavity; adhesions were extensive and the peritoneum was very generally studded with small pinhead foci of these papillary carcinomatous growths. After rapid excision, twenty-four ounces of the oil "Oleum Telesphoro" were introduced into the abdomen. Patient made a most excellent recovery, gaining very materially in flesh during her three weeks in the hospital. It is too early as yet to decide whether the oil has had any inhibitory action on the extension of this growth, but just before leaving New York, a little more than three months since her operation, she wrote that she was rapidly gaining in flesh and strength, had no abdominal distress. In this case I had Dr. Dieffenbach give thorough post-operative treatment with the X-ray.

CASE 3. Mrs. H., aged 31, married; no children. History of recurrent attacks of pelvic peritonitis for the three months previous to being referred to me. Uterus was firmly fixed in pelvis and diagnosis of small pus tubes was made. On opening the abdomen, freeing the adhered intestines and walling back with wet gauze pack, the tubes distended with pus to about one inch in diameter at the ampullæ were found firmly adherent in the cul-de-sac. Cultures from same diagnosed as gonococcus infection and still virulent. After pressing out the pus with sponges, the tubes were syringed out with hot saline solution; a catgut wick No. 2 was threaded down through each Fallopian tube into the uterus and sutured into place with No. 0 catgut. One pint of sterile oil was then introduced and the patient put to bed in the Fowler position. The second day free oil was demonstrated in the vaginal discharges; patient made an excellent recovery, left hospital on the eighteenth day, and when examined four months later, pelvis was found to be apparently normal.

CASE 4. Mrs. B., aged 77. Had had three laparotomies, all of which had healed by second intention. The last operation had been for intestinal obstruction several years previous. Adhesions had re-formed so extensively from recurrent attacks of peritonitis and suppuration that she was again suffering from severe bowel stasis and threatened with complete obstruction. She had a large ventral hernia at the site of one of her previous incisions, in the sac of which the intestines were everywhere adherent to the skin, bombarding peristalsis was plainly visible through the abdominal walls. After a very tedious time breaking up adhesions, which were everywhere present, and in many places badly displacing the viscera (which, by the way, form the worst type), 750 cc. of oil were introduced. Patient made an excellent recovery and now, after nine months, says she is absolutely free from abdominal discomfort, a condition which had not obtained for over twenty years previous to last operation.

We have also used this neutral oil with most gratifying results in cases of tubercular peritonitis, general septic peritonitis; many cases where gauze packs had been used or where there had been much handling of the viscera, but especially in extensive old adhesion cases. We find it a most excellent germicidal lubricant in gynecological and obstetric cases, an especially bland and useful oil for enemas and bladder irrigation, and an admirable basic cerate for massage and local medication.

Our deductions from the experiences with sterile vaseline oil recorded by Prof. Wilkie of Edinburgh, Scotland, would, contrary to his conclusions, induce us to discourage its use in postoperative abdominal surgery, for this vaseline oil is a purely mineral product, cannot be readily metabolized, and can only be handled by the system by being first emulsified by the body fats. Even then it is very difficult of being metabolized or excreted. More frequently it becomes encysted and thus remains a permanent foreign body. This is borne out by experiment Nos. 2, 8 and 11 recorded by Wilkie, who found on reopening the abdomen of rabbits where sterile vaseline oil had been introduced, a so-called "cream-cheese-like" material present after two or more weeks.

There are a few points in regard to the handling of the neutral animal oil which are quite essential to its proper use. The stock should be kept preferably in stone jugs or wooden casks, in a cool, dry place, away from sunlight.

In the preparation and sterilization for use, we have found that we can best preserve it in its

neutral pure state by pasteurization three times at from 80° C. to 88° C. in tightly sealed amber-colored bottles, to keep out moisture and prevent the action of sunlight. Around these bottles it would be well to wrap two or three layers of black photographic paper to further keep out the light, as it has been found that light, moisture, and excessive heat all favor rancidity, oxidation and the liberation of free fatty acids. This oil, however, is so stable in composition, that we have left it open for weeks at a time in shallow dishes exposed to the air and have found no evidences of rancidity. We avoid giving cool enemas or the application of ice bags to the abdomen, as the oil readily stiffens up whenever the temperature is reduced below that of body temperature. In all bad pelvic and pus cases, we find it essential to gravitate the oil to the lower part of the abdominal cavity, in which place it is most useful and where its absorption is longest delayed. We therefore keep the patients in the Fowler position for, usually, from seven to ten days.

In conclusion, we would summarize our experiences as follows:

Oil, vegetable or animal, is the best substance thus far used by us for the minimization of postoperative sequelæ, especially adhesions.

This neutral animal oil fulfills to the highest degree the essentials of a perfect menstruum. We would recommend its use in cases where there has been excessive handling of the abdominal viscera. In all cases where adhesions are present or feared. In cases where there have remained extensive uncovered raw surfaces. In all septic cases to favor free abdominal drainage either to the pelvis or drainage tracts. In conservative operations on the pelvic organs, especially where it is desired to obtain patulous tubes.

It is quite possible that further experience may lead us to recommend its almost universal use as a most desirable medium for the lessening of many of the postoperative sequelæ.

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CHRONIC INTESTINAL STASIS[1]

BY WM. ARBUTHNOT LANE, F. R. C. S., LONDON, ENGLAND

I FEEL greatly honored by being asked to address you on this occasion. I have come over here, as I have done twice previously, to learn from you all I could to try to improve my methods as far as possible. Thanks to the great kindness of my American friends, I have had every opportunity of acquiring information from their practice and technique, which cannot be excelled in any part of the world. I think that the chief factor which makes for success in American surgery is the extraordinary good feeling which exists amongst surgeons here, who appear to vie with each other in the generous appreciation of one another's work.

You have asked me to speak about intestinal stasis. I am very pleased to do so, not that I think that the little I have done is deserving of any appreciation but because I am anxious to interest you in a subject which I believe will prove to be of enormous importance in the future. By intestinal stasis, I mean such a delay of the contents of the intestines in some portion of the gastro-intestinal tract, but more particularly in the large bowel, as allows of the absorption into the circulation of a larger quantity of toxic material than can be dealt with effectually. This delay results from a mechanical alteration in the normal arrangement of the drainage apparatus. In early life it is produced by an abnormal distension of the intestine, consequent on too frequent feeding, or by the use of articles of diet of an unsuitable nature. Later, it is brought about and ac-

[1] Read before the Chicago Medical Society (by invitation), October 5, 1910. See discussion, p. 537.

centuated by the erect posture of the trunk, which is assumed from the time of getting up until going to bed. To consider these changes thoroughly, one should render oneself familiar with the general principles that govern the changes which the individual undergoes when the mechanical relationship to surroundings differs from the normal. They are roughly three: The first is that pressure produces distinct changes, strain also results in definite alterations, and the advantage which the organism will gain from an entirely new mechanism may result in its development. Unless one calls attention to these general principles, it seems almost impossible to make surgeons understand that the bands and changes to which I have called attention are evolutionary and not inflammatory, and that they exist in the first instance for the advantage of the individual.

I believe that all variations from the normal in the skeleton and soft parts which develop in the bodies of laborers in order to enable them to perform their function more economically, tend to shorten the duration of their lives.

It is impossible for me to discuss this matter in the brief time at my disposal, but I would ask you to accept the fact that the development of the several mechanical changes are evolutionary and beneficial on the whole, though they are associated with consequences which are frequently prejudicial to the life of the individual. In other words, nature makes the best it can of a bad job, and the cost of living in a civilized community is great from one point of view while it is compensated for in other ways. The changes are primarily mechanical and secondarily toxic.

The mechanical changes are:

1. An abnormal fixation of the pylorus, by the development of a new band, which attaches it to the under surface of the liver, in front of the transverse fissure. This band serves the purpose of affording an additional ligament to the stomach. It may extend forward for a considerable distance in front of the transverse fissure, and may involve the cystic duct and gall-bladder, and interfere with their normal functioning. Again, this band may extend over the pylorus and may attach and help to support the transverse colon.

2. This fixation of the pylorus may result in the production of a kink, which may be sufficient to interfere with the normal functioning of the stomach and duodenum. In consequence of this areas of engorgement of the mucous membrane arise in the first part of the duodenum or in the lesser curvature of the stomach. While the stress sustained at the point of engorgement is a primary factor the lowered resisting power to the entry of microorganisms due to auto-intoxication, takes a large share in the production of the inflammatory changes in the mucous membrane. These areas of abrasion later form ulcers which may after a time become affected by tubercular, cancerous, or other infections. The ulcer of the duodenum rarely becomes malignant, probably because it so readily yields to treatment. For instance, the performance of a gastroenterostomy will almost certainly result in the healing of a duodenal ulcer, while its curative effect upon a gastric ulcer is often very doubtful.

The variation in the locality of the ulcer in the two sexes would appear to be dependent on the difference in the nature of the strain consequent on the varying forms of the abdomen.

3. There develops on the under surface of the mesentery of the last few inches of the small intestines a new band, which at first forms part of the under surface of the mesentery. Later it forms a ligament distinct from the mesentery. This ligament contracts and deforms the ileum, producing a kink or obstruction of this portion of the intestines, especially in the erect posture of the trunk. In consequence of this kink the small intestine becomes very much dilated and this dilatation may extend up as far as the pylorus. The symptoms produced by this obstruction are superficially very much like those of appendicitis and in consequence a large number of normal appendices have been removed to bring about the cure of symptoms resulting from this obstruction, needless to say, without any particular benefit or advantage to the patient. The symptoms produced by this type of obstruction are very definite and need not be mistaken for those which result from a kink in the appendix.

This kinking of the appendix is frequently

associated with the kinking of the ileum, since they are the result of the same cause, namely, the effort of nature to keep the cecum as much in its place and out of the pelvis as it can.

4. Strong bands of peritoneal adhesions develop between the outer aspect of the cecum and ascending colon and adjacent abdominal wall with the object of holding up the cecum, which in the erect posture becomes overloaded with fluid contents.

These bands may occasionally interfere with the evacuation of the cecum, by producing a kink.

One of them not infrequently secures the appendix, which is made to form one of the ties or resistances opposing the downward displacement of the cecum.

Unfortunately, the anchoring of the appendix spreads from its base and being hollow the strain upon a portion of the appendix may result in the occlusion of this tube, distal to the point of fixation, and in the formation of an obstruction.

I believe that the development of so-called appendicitis is almost always produced in this way. When the appendix is quite free, it is probable that the ileal kink is the cause of the symptoms.

5. Both the hepatic and splenic flexures are drawn upwards, reducing the lumen of the bowel at these points and rendering the passage of feces difficult.

In consequence, abrasion, ulceration, and cancerous and other infections are common in these situations.

6. The kinking at these points is much exaggerated by the fall of the transverse colon. The weight of the loaded transverse colon is distributed partly through the ligaments of these kinks and partly through the convexity of the stomach and through the newly developed ligament of the pylorus. When this last ligament extends to and secures the transverse colon, it may occlude its lumen materially at this point, rendering it a favorite locality for cancer.

The under surface of the transverse mesocolon shows acquired bands, similar to those which kink the end of the ileum.

7. Nature attempts to keep the sigmoid loop filled with solid feces out of the true pelvis by the formation of bands on the outer surface of the mesosigmoid. These by their contraction convert the mobile loop into a straight fixed tube. The lumen of this tube is subnormal, and its muscular coat is wasted because of its fixation. This fixation of the sigmoid renders the passage of solid feces through it difficult, and this difficulty is manifested as engorgement, abrasion, ulceration, or cancerous or other infection of the mucous membrane.

Diverticula or foci of inflammation may develop. These again may become affected by cancer, tubercle, etc. Should the center of this loop escape from the grip of the newly formed bands, the extremities of this loop are approximated by their contraction when the loop itself becomes progressively dilated by the difficulty which arises in its evacuation so that a so-called volvulus results.

8. The left ovary is frequently involved in the adhesions which bind down the lower portion of the sigmoid and the upper part of the rectum. The ovary becomes cystic in consequence of its fixation in the newly developed bands, later forming a tumor which for a time performs some of the functions so usefully performed by the pregnant uterus of raising the fallen viscera and overcoming obstructions.

9. The condition of the rectum varies very greatly. While in some cases the rectum is short and dilated, in others it is enormously elongated, so that it puddles as a long, loose tube in the true pelvis. This last condition renders the passage of solid feces through it very difficult, since any downward pressure, however great, is exerted at a marked mechanical disadvantage on the fecal contents. The introduction of enemata and the use of powerful cathartic drugs afford very little relief to the sufferer, but often produce so much pain, discomfort, and vomiting, that the patient dreads to employ them. Piles, ischio-rectal infections, and cancer of the lower part of the rectum are often direct consequences of constipation.

These patients are usually regarded by medical men as being merely stupid and they are told that if they take sufficient pains, they will quickly get well. I would refer those gentlemen who are interested to a discussion on the subject of constipation and its treatment by any body of eminent physicians in the world.

If they will not derive much instruction from it, they will at all events be much amused.

10. Associated with intestinal stasis, there is a considerable ascent in the level of deleterious organisms in the small intestines with occasional infections of the biliary and pancreatic duct, producing gall-stones, pancreatitis, and later cancer of these several structures.

How great a part is played in the production of gall-stones and pancreatitis by the direct infection of the ducts from the intestines and by the influence exerted upon them by the septic products of auto-intoxication is difficult to determine.

I have no doubt that one or both factors bring about these changes and that the mechanical interference with the function of the gall-bladder and duct by adhesions may facilitate the formation of gall-stones.

It is well to remember that the deleterious organisms of the intestines readily migrate through the blood stream or for example to the genito-urinary tract in both sexes, from which they are expelled with the greatest difficulty in most cases, while not infrequently they are ineradicable.

Constipation is chiefly associated with stasis in the large bowel and is more marked the lower the area of stasis. In some localities the stasis may result in diarrhœa or constipation may be replaced by periods of diarrhœa. Definite infections by various micro-organisms may result in inflammation of the intestines, of an acute or chronic character. It is not very rare to have evidences of very marked auto-intoxication in cases in which there is a daily evacuation.

As to the symptoms which result from auto-intoxication, they vary largely with the locality and nature of the stasis.

Speaking generally, they are:

1. Loss of fat. This is a very serious symptom, since it allows of mobilization of many organs, such as the uterus, kidneys, and liver, and increases the prolapse of the intestines, which is the primary cause of the condition, so bringing about a vicious circle.

2. Circulatory changes arise consequent on changes in the muscle structure of the heart and vessels. Following on this, the patient feels the cold very much and the hands and feet are cold, clammy, and livid. They may lose sensation in the legs. The ears are bluish and the subcutaneous tissue of the back of the upper arm is swollen and watery and the skin is frequently covered with minute papules.

3. The respiratory function is inhibited to a varying extent. In marked cases respiration is entirely diaphragmatic.

4. The skin is stained of a dark color. This is most marked in certain situations, as about and below the eyelids, around the neck, about the folds of the axilla, around the abdomen where the stays or dress presses, and in the opposing aspects of the thighs. There is frequently an abnormal growth of hair, especially on the forearm. The darker the hair, the more marked is the staining of the skin and the several other degenerative changes. In a red haired subject they may be altogether absent. The perspiration may be very offensive.

5. The patient suffers from much pain and weakness in the muscles. This is most marked in the legs, so that the sufferer may be quite unable to stand. It is also very bad in the back and in the muscles of the arm. Associated with this muscular pain, there is a considerable stiffness of the joints combined in some cases with marked degenerative changes. After the large bowel has been removed, or put out of gear, the first thing the patient notices is that her pains have gone, that she can move her joints, and especially those of the hand, with much greater freedom than before the operation.

6. Headache is very commonly complained of. The patient awakes in the morning with a heavy dull headache and with a feeling that she has obtained no relief from sleep. This feeling increases during the day. This headache, combined with the pains in the limbs, and the feeling of great muscular disability and incapacity to perform any physical or mental work, makes the patient miserable and melancholic.

In young life the physical disability which results from the auto-intoxication renders the patient unable to lead a normal life, forcing her to assume resting postures, such as flat foot, knock knee, lateral curvature, dorsal excurvation, etc. Rickets is merely another manifestation.

7. The resisting power of the individual to the entry of organisms into the tissues is lowered proportionately to the degree of auto-intoxication. Consequently these subjects are very liable to infections of the gums, tubercle, rheumatoid arthritis, gout, etc. For instance, I feel so strongly that the infection of the bacillus of tuberculosis is secondary to this intestinal intoxication, that in advanced cases of tubercular disease of joints I have on several occasions divided the ileum and established a communication between it and the rectum. This has resulted in the greatest benefit to the individual, both as regards the local disease, and also the general condition of the patient. Possibly some of the surgeons present may have witnessed the results of this treatment.

8. The breasts undergo very definite changes which at first are trivial in character, but which too frequently lead to the development of cancer. The upper and outer zone of the left breast and later the corresponding area of the right breast, becomes hard and nodular. This is increased at the menstrual period, when there may be pain also.

This process extends to the whole gland, in which after a time cysts of varying size develop, and in these intracystic growths may form. In some of these breasts small cancerous nodules are not infrequently found, when there has been no clinical evidence of their presence. One of the most remarkable results of the exclusion of the large bowel from the drainage scheme is the rapid improvement in or recovery of the degenerated breasts. This seems to me to be a matter of the greatest importance.

9. In reference to this very common type of degeneration of the breast from auto-intoxication, I had a case of very advanced auto-intoxication in a middle aged woman who had had a thyroid tumor large enough to keep her chin up for nine years. She refused to have it removed. Immediately after she had had exclusion of the large bowel, the tumor commenced to decrease. In a month it was only as large as a marble. The nodular induration of her breast, which was very marked, also subsided rapidly. I merely mention this case, as it is very suggestive.

As Professor Metchnikoff remarked, "C'est un cas qui coupe." Metchnikoff has followed my cases very closely for the last three years, by sending over his chief assistant, Dr. Cohendy, and Dr. Distaso, for six weeks each year. These gentlemen are dealing with the results of their observations, which appear to be of great importance, and they propose to publish them at once.

Perhaps no class of cases calls for our sympathy more than do these poor, miserable toxic men and women. They usually pass through many hands, are called neurasthenics, they are always wretched and hopeless, since they are not only frequently unable to do any mental or physical work, but they are quite unable to live a normal existence. Many of the patients whom I have short circuited or whose large bowel I have removed, have been so weakened that they have spent months in bed. One woman had to take six drops of croton oil twice a week for months. This assisted by enemeta managed to produce an evacuation by a process which was painful and uncomfortable in the extreme. Since she has been short circuited, she has had a daily action and is as happy as the day is long. I know no operation in surgery which produces such a change as does this one of colon exclusion.

The poor, wretched, stupid, feeble woman, who is rendered ugly and unattractive by her thinness, by the staining of the skin, by her smell, her bad temper, general appearance of irritable old age, with her cold clammy hands, with the aches and pains in her legs, loins, and arms, becomes in a few days a bright eyed woman, sweet smelling, active mentally and physically. Each week and each month shows a steady improvement and she gradually recovers her youth. Her appetite returns at once, she rapidly gains in weight.

Several of these cases have married after the operation. I am certain that no one would have married them previous to the operation, even if the patient were willing to marry, in the circumstances, which I think to be very doubtful.

The relief which is afforded by operation is out of all proportion to the risk incurred, not that these cases take the risk of death into consideration, as life presents no attraction to them. The risk is ridiculously small, con-

sidering the miserable physical and mental condition of the sufferer.

I do not think it proper to discuss the medical treatment of intestinal cases, previous to operation, but the mechanical treatment by means of liquid paraffin and of a suitable support or corset, affords very great benefit.

Personally, I regard the utility of all drug treatment with great suspicion, but that subject I would leave to my medical colleagues whose business it is.

I regret that I have only been able to touch but very briefly on several points in relation to intestinal stasis, to which I wish to call your attention, but I trust that the brief sketch which I have attempted to put before you may give you some indication of what I hope to convey.

INJURIES OF THE VENOUS SINUSES OF THE BRAIN

With a Report of a Case of Injury of the Longitudinal Sinus and a Review of the Literature

By EDWARD M. BROWN, M. D., Chicago, Illinois
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THE fact that the injuries of the great sinuses of the brain and their treatment are given so little space in the average text-book on surgery is my reason for bringing this subject before the members of this society. The reason they receive only scant reference in the text-books is, perhaps, because the accompanying injury of the brain is often so extensive and destructive as to eclipse rupture or tears of the sinuses or their communicating blood-vessels, and because frequently surgeons of large practice in other lines see few cases of sinus injury. It largely depends on what kind of practice one has. Railroad surgeons and surgeons caring for those exposed to violent injury, as iron and steel workers, are sure to see in their practice more of such injuries. Although sinus injuries are rated as comparatively infrequent, it happens that many of the cases, less extensive in character, and which consequently can be treated more successfully, are often seen first by the general practitioner.

One of the best papers written on this subject in recent years (and from which I quote frequently) is that of Wharton (1). (Ann. of Surg., xxxiv, p. 81–187.) He reports five cases of his own and reviews sixty-five others collected in the literature, seventy in all up to that time (1901).

It is my purpose to briefly report my own and review these seventy cases and other cases reported since Wharton's paper.

Case 1. Miss M. S., a little girl aged eleven years was referred to me at the West Side Hospital by her physician, Dr. J. S. Pigall, of this city, December 11, 1907. On the previous evening she was in attendance at a "children's party" in the basement of a neighboring church. While at play a small gas fixture was detached from the low ceiling and fell, striking her on the vertex of the skull, near the median line. She bled quite freely at the time, was taken home, and later dressed by her family physician. The scalp was shaved in the region of the wound, which was only a pencil-point puncture. The wound and region about were thoroughly cleansed and a firm gauze pad, which seemed to control the oozing perfectly, was applied.

Next morning, on removing the dressing, her physician found that the wound bled almost as freely as when he first dressed it, and was attracted by the dark venous appearance of the blood. On investigation with a probe he found that, as he stated, "the probe almost dropped into the cranial cavity." He wisely replaced the gauze pad and sent the patient to the hospital, having made a tentative diagnosis of fracture and injury of the longitudinal sinus.

I saw the patient on admission to the hospital and, on examination, found absolutely no symptoms except a slight dilatation and inactivity of the pupil in the left eye, and, of course, the wound, a small scalp puncture, a little to the right of the median line on the vertex of the skull, from which dark venous blood oozed freely. The patient was playful and without any discomfort whatever.

After anæsthesia a semilunar incision was made through the soft tissues down to the skull and the flap raised. A comminuted depressed fracture was found posterior and a little to the right of the mid-sagittal

line. The skull was rather thin and the fractured and depressed portion involved an area little smaller than a silver half-dollar. The fragments, which seemed *not* to impinge upon the bleeding and lacerated dura and sinus, were first removed. The spiculæ of bone *in* the sinus seemed to control the hæmorrhage fairly well. When they were removed an alarming hæmorrhage followed, but was immediately controlled by a plug of iodoform strip gauze which was in readiness. Although the tear in the dura involved a good portion of the sinus wall and slightly beyond, it was found that with careful adjustment the size of the tampon could be lessened considerably. There being evidently no subdural hæmorrhage or clot, no further exploration was deemed necessary. The flap was stitched back in place and supported the tampon. The stitches in the lower angle of the wound were left so they could be loosened and the gauze tampon and sinus easily reached.

On the fourth day the gauze packing was cautiously loosened up, but while doing so the plug in the torn sinus was expelled and a large stream of blood again gushed forth. It was repacked, as at first, and when removed four days later the sinus was apparently occluded, for no hæmorrhage was present. Two or three days later all drainage was removed and secondary sutures tied. The inequality of the pupils disappeared the day after operation. No infection occurred, and recovery was otherwise uneventful and complete.

Of the injuries of the great sinuses of the brain, that of the superior longitudinal is perhaps the most frequent and fraught with least danger (2). (Cushing, Keen's Surgery, iii.) It lies slightly to the right of the median line and changes greatly in form and blood-holding capacity as it passes backward. In its mid-course broad expansions occur, known as lacunæ laterales, parasinoidal sinuses, or *lac sanguin* of the French, which pass out between the two layers of the dura for a distance of from 1.5 to 2.5 cm. over the hemispheres.

Into these lateral expansions enter many of the more important of the superior cerebral veins, particularly those which ascend in the sulci bounding the paracentral convolutions, and from them emissary veins pass through the inner table to communicate with the diploic vessels. It is for these reasons that injury to the skull in this region, or efforts to operate here, are especially likely to be attended by alarming hæmorrhage.

The calvarium cannot be separated from the dura without tearing the emissary veins or injuring the thinned-out layers of the dura covering the Pacchionian granulations. Nor can the dura itself be lifted from the brain without injury to the cerebral veins which, as well as the Pacchionian bodies, serve to bind it to the cortex (3). (Gray, Text-book of Anatomy.)

The cerebral veins enter the sinus by long, obliquely-placed channels, which pass forward against the direction of the blood current. Since the lacunæ laterales are sufficiently broad to cover the motor area or centers for the lower extremities, it is evident that these centers are difficult of access (4). (Cushing, Keen's Surgery, iii.) For this reason, also, ligation of the sinus in its mid-course is almost impossible.

The other sinuses of everyday surgical interest are the lateral sigmoid and cavernous (5). (Archibald, Am. Pract. Surg., v, p. 206.)

The lateral sinus extends from the internal occipital protuberance to the posterior inferior angle of the parietal bone. Here it leaves the tentorium cerebelli and tends downward and inward on the inner surface of the mastoid portion of the temporal bone. This portion of the sinus from the angle of the parietal bone to the jugular bulb is known as the sigmoid sinus because of its shape. The lateral and sigmoid sinuses are exposed to injury by fractures involving their bony grooves, and are especially endangered in operations on the mastoid cells.

The cavernous sinuses lie at the sides of the body of the sphenoid bone. Each sinus commences anteriorly at the inner end of the spenoidal fissure, where it receives the corresponding ophthalmic vein, and terminates at the apex of the petrous portion of the temporal bone by dividing into the superior and inferior petrosal sinuses. They have been injured by operations on the sphenoidal sinuses, in childbirth, and in fractures or fissures, extending into the middle fossa.

After a brief history of the cases found in the literature since Wharton's paper, I will discuss these further.

CASE 2. E. F. Buzzard and Jos. Cunning (6). (Trans. London Clin. Soc., xxxix, p. 123.) Male, aged twenty-eight years. Fell on back of head, receiving a small scalp wound. Two weeks later came to hospital complaining of constantly increasing headache since accident. Wound was healed. No depression, nor prominence, nor cranial tenderness was found. Pupils normal. No ocular palsy, nystagmus, hemianopsia, nor optic neuritis. Muscular power and co-ordination unimpaired. Left knee-jerk more brisk than right. Four days later patient vomited. Paresis of left hand

and leg and left side of face. Semicomatose. Pulse, 60–70. Temperature subnormal. Hemianæsthesia, hemianopsis, no optic neuritis. Exaggerated knee-jerk, ankle clonus, and extensor plantar reflexes on left side. Left abdominal reflex not present. No convulsions. Tentative diagnosis, cranial abscess. Operation revealed a hæmorrhage from the longitudinal sinus, attributed to tearing of the tributary veins at their junction with the sinus.

Improvement was very slow and recovery was not complete at time of report. The interesting points of this case, as pointed out by Buzzard and Cunning, are:

1. Hæmorrhage from the venous sinus without fracture.

2. Slow development of symptoms, which was due to venous hæmorrhage against normal intracranial pressure until the skull was opened, when the hæmorrhage became alarming.

3. Long period before improvement of the hemiplegia, due to (*a*) The prolonged interference with cortical function by pressure. (*b*) Œdema of the brain substance after relief of pressure. (*c*) Anemic condition of the patient.

4. Diagnosis of cerebral abscess, which probably would be made with any such case, even without optic neuritis. The symptoms, unaccompanied by convulsions, pointed to a deep abscess exerting pressure on optic radiations and internal capsule. The absence of convulsions is explained by the slow accumulation of venous blood in contrast to the rapid arterial accumulation.

5. The importance of a careful examination of a patient complaining of nothing but a slight injury of the head, the absolute reliance which can be placed upon an extensor plantar response, the absence of the abdominal reflex on one side and optic neuritis as evidence of an organic lesion, are well emphasized in this case.

Case 3. B. Forquhar Curtis (7). (Ann. of Surg., xxxvii, p. 848.) J. McC., aged forty-two years. Shot in back of head by large-caliber pistol, ball penetrating the skull. Loss of blood considerable, but was stopped by pressure. Patient was able to walk. Headache was severe. No paralysis or anæsthesia. There was complete blindness of the right half of both visual fields; no oculo-motor disturbance. The bullet penetrated the skull just external to the external occipital protuberance. On removing bones, terrific venous hæmorrhage occurred. Controlled by large gauze pack. Bone was removed around the bleeding point for an extent of one and one-half by two inches, when it was seen the sinus longitudinalis was wounded near the torcular Herophili. A ligature passed completely around the sinus and tied partially stopped the bleeding, and a gauze pack completely controlled it. After a later operation for removal of the ball, which was not found, the patient slowly recovered.

Curtis points out the necessity for marking all plates in making radiographs of the skull right and left, as failure to do so in this case resulted in not finding the bullet.

Case 4. W. R. Simmons (9). (Long Island Med. Jour., iii, p. 94.) Female, aged thirty-five years, was struck on the head by scissors falling from roof. Produced a large, lacerated wound on the vertex, the bone being depressed. Fragments of bone were removed and profuse bleeding from the longitudinal sinus immediately followed. An open forceps, one jaw on each side of the falx cerebri and pressed against the skull, was closed. This stopped most of the bleeding and, supplemented with a gauze pack, control of hæmorrhage was complete. Recovery.

Case 5. Same author (9). (Long Island Med. Jour., iii.) Boy, aged twelve years, was struck on the head with an ax. Unconsciousness and frequent convulsions followed. Examination revealed lacerated wound in left frontal region, with depressed bone area beneath. The wound was enlarged and the fragments removed. Immediately increase of hæmorrhage from anterior portion of longitudinal sinus followed. Hæmorrhage controlled by gauze pack. Recovery.

Case 6. Erdman (10). (Ann. of Surg., xxxvii, p. 607.) Male, aged twenty-six years. Gunshot wound in the median line, frontal region, penetrating the skull. Patient unconscious. Left side paralyzed. Skull comminuted and hæmorrhage profuse.

Fragments of bone were removed, followed by increased hæmorrhage, traced to a large tear in the longitudinal sinus. Wound packed with gauze and patient quickly sent to bed. Two days later pack removed. Wound repacked. Three days later packing was removed and there was no bleeding. Two weeks after the injury a flap was raised and a large subdural clot and lacerated brain tissue were removed. Recovery.

Case 7. F. P. Emerson (11). (Laryngoscope, St. Louis, 1909, xix, p. 43.) Female, aged twenty-one years. School teacher. First seen and treated for caries of outer wall of spheniodal bone. Wall was removed and later curetted. Later patient returned, as old symptoms had recurred. Examination revealed carious area on outer wall of right sphenoid, with soft mass protruding taken for a polypus. A curette being introduced, a terrific hæmorrhage and unconsciousness immediately followed. A gauze tampon controlled hæmorrhage externally, but symptoms of severe brain pressure quickly developed, and the patient died seven hours after the accident.

Autopsy: Large clots filled the calvarium. A large varicose vein was found to occupy the outer wall of the right sphenoid bone. This large varicose vein communicated directly with the cavernous sinus, and its injury caused the hæmorrhage and death.

Case 8. W. G. Porter (12). (Ann. of Surg., xxxiv, 189.) In discussing Wharton's paper, Porter mentions a case of accidental injury of the longitudinal sinus in trephining for some other condition. Hæmorrhage was frightful, but immediately controlled by gauze pack.

Case 9. Starr, cited by J. Ransohoff (13). (Ann. of Surg., xxxviii, p. 488.) In operating for cerebral tumor, Starr encountered enlarged diploic veins connected with the lateral sinus. They were enormous and opened outward. When the pericranium was removed several little holes in the skull opened, from which venous blood poured out. The operation was discontinued because of the hæmorrhage, which was with difficulty con-

trolled by pressure of a gauze pack. The patient recovered.

CASE 10. Joseph Ransohoff (14). (Ann. of Surg., xxxviii, p. 488.) Female, aged thirty-eight years. Two years before presenting herself had epileptic seizures, beginning in the right arm, later extending to the right side of the face and right leg. Attacks occurred about once a week. Headache was constant; ocular muscles were normal. Ophthalmoscope showed typical papillitis and beginning optic atrophy. Diagnosis: Tumor of left cortex.

Operation. Horseshoe incision over Rolandic area down to the bone. Bleeding from the scalp was not unusual. Kummel's electric drill was used for opening the skull. Hæmorrhage was immediately quite profuse. Sudek's smallest-sized fraise was next inserted, with the view of making a bone flap. About one inch of bone was cut through, when it became evident that hæmorrhage would prevent the completion of the operation by this method. Wax was used to check the hæmorrhage without result. Compression of both carotids did not control it. A large trephine was then used to speedily get at the source of bleeding, but the patient became blanched and died when the dura was exposed.

Autopsy. A gliosarcoma was easily lifted out from between the convulutions directly under the trephine opening. The longitudinal sinus was much widened at a point midway between the coronal and lambdoid sutures. Large diploic veins anastomosed with very much dilated lacunæ laterales.

Ransohoff questions, and I think rightly, whether tying of the carotids would have saved this patient. It would seem better judgment to attempt to reach the source of hæmorrhage speedily, as he did, for tying the carotids would certainly have taken more time.

CASE 11. Robert H. M. Dawbarn (15). (Ann. of Surg., xxxviii, p. 323.) Boy, three weeks before coming under Dawbarn's care, fell fifteen feet, fracturing frontal bones and bones of face. Had meningitis and recovered. When seen by Dawbarn, was semi-conscious; pupils equally dilated, reacted to light and accommodation. Right, moderate strabismus. Ecchymosis about eyes. Left upper lid drooped. Unable to walk alone.

Operation. Found frontal bones comminuted and frontal sinuses filled with granulations, exudate, and pus. This was cleaned out, packed with gauze and drainage made through the nose. A spicula of bone was found puncturing the longitudinal sinus opposite the coronal suture. On removal of this the sinus bled freely, but was controlled by non-absorbent gauze pack. Gauze was removed in forty-eight hours without bleeding. Recovery uneventful.

CASE 12. Feodor Krause (16). (Surg. of Brain, i, p. 36.) Girl, ten years of age. Afflicted with Jacksonian epilepsy, with primary manifestation in left foot. To reach the brain center animating the foot it was necessary to expose the upper edge of the cerebral hemisphere. In opening the dura the longitudinal sinus was torn. The wound was of considerable length and bleeding profuse. A clamp longitudinally applied controlled it completely. The osteoplastic flap was sutured back in place except for a small opening through which the handles of the forceps protruded. After three days the clamps were removed and no bleeding followed. The operation on the cerebrum was completed ten days later.

CASES 13 to 16. Phelps (17). (Ann. of Surg., xlix, p. 472) reports four cases of injury of the sinuses in addition to those included in Wharton's collection.

CASES 17 and 18. Cushing (18) (Keen's Surg., iii, pp. 96 and 127) mentions two cases of injury of the cavernous sinus, one in the newborn, with fracture at the base and a fissure extending into the middle fossa, which led to a tear in the cavernous sinus. Another after a Gasserian ganglion operation in which the cavernous sinus had been injured. Both showed the characteristic exophthalmus, œdema of the retina, ecchymosis of the lids and soft parts, with enlargement of the venous radicles about the temporal and supra-orbital region.

Pulsating exophthalmus is said in seventy per cent of cases [Cushing (19) (Keen's Surg., iii, p. 132)] to be due to traumatism of the base of the skull, by fissures of the base extending to the middle fossa, where the cavernous sinus and internal carotid artery lie near each other in their common dural sheath. They may be so injured that anastomosis results.

CASE 19. Molinie (20) (Le Larynx, Paris and Marseilles, 1909, No. iii, 82) records an interesting case of hæmorrhage from the cavernous sinus following a mastoid operation. The patient eventually died from repeated hæmorrhages and autopsy showed that the sinus wall in proximity to the carious bone had become ulcerated through.

CASES 20 and 21. De Forest Willard (21) (Ann. of Surg., xxxiv, p. 189, discussion) mentions two cases of injury of the longitudinal sinus and one of injury of the lateral sinus. In one of the longitudinal sinus injuries there was a circumferential fracture dividing the skull into anterior and posterior halves in which the sinus was torn, although the bones were not much displaced. He trephined in the parietal region, and as the sinus was approached the hæmorrhage was enormous. A gauze pack speedily and entirely controlled it.

CAUSES OF INJURY TO THE VENOUS SINUSES

1. Operations in which the sinus may be cut or lacerated accidentally, as in trephining in the Rolandic area and in operations on the mastoid bones.

2. Depressed fracture of the skull and injury to the sinus walls by fragments of bone.

3. Injuries without fracture in which the force transmitted through the bones of the skull tears or lacerates the cerebral veins at their entrance to the sinus, as in Buzzard's and Cunning's case.

4. Penetrating wounds as in the case of gunshot or wounds made by sharp instruments.

5. Impact of foreign bodies, as in Ross' case, operated on by Deaver (22) (Ann. of Surg., xxxiv, p. 189), in which a bullet, falling, struck on top of the head, injuring the longitudinal sinus.

6. Divulsion of the bones of the skull in childbirth, as in Litzman's (23) (Dennis' Surg., ii, p. 641) and Cushing's (24) (Amer. Jour. of Med. Sci., 1905) cases, in women having narrow or deformed pelves.

FREQUENCY—COMPARATIVE AND RELATIVE

No great number of cases of sinus injury seems to have occurred in the practice of any one surgeon.

Phelps (25) (Ann. of Surg., xliv, p. 472) in reviewing one thousand cases of head injury occurring in his own practice, records only eight cases of injury of the great sinuses. Six were of the longitudinal, two of the lateral and sigmoid, and one of the cavernous.

Chipault (26) (cited by Wharton, l. c.), in 117 cases of head injury, records thirty cases of injury of the sinuses.

Treves (27) (Text book on Surg.) says that of all cases of extradural hæmorrhage the sinuses contribute about fifteen per cent to twenty per cent.

Litzman (28) (Dennis' System of Surg., ii, p. 641) observed two cases of longitudinal sinus injury in the newborn in women having narrow flat pelves, with the promontory of the sacrum so arranged as to make deep pressure on the head, in consequence of which the sagittal border of the parietal bone pierced the dura and opened the sinus.

Cushing (29) (Amer. Jour. of Med. Sci., cxxx, p. 563) records two such cases, in which basilar fractures injured the cavernous sinus, causing hæmorrhage.

Bergman (30) (cited by Wharton, l. c.) mentions two cases of rupture of the transverse sinus and says that this sinus is liable to injury when force is applied from above and behind, as a result of which the skull is compressed in a downward direction.

SYMPTOMS AND DIAGNOSIS

Practically all the symptoms found in intracranial hæmorrhage from other causes may be found in hæmorrhage from the great sinuses. Pressure symptoms of a marked degree from injury of the sinuses alone, except from the basilar sinuses, rarely occur.

An epidural clot of any great proportion due to sinus hæmorrhage is not likely to occur, because the blood pressure is not sufficient to dissect the dura from the skull to any great extent. The force causing the fracture and depression of the bones will sometimes separate the dura from the skull for a considerable area and a clot form therein, causing cortical pressure of an appreciable degree.

If the tear in the sinus communicates with the subdural space, a subdural clot of considerable size may be formed, but usually not sufficient to cause the pressure symptoms of an arterial hæmorrhage. It has been shown that blood poured out slowly as from a sinus is much better tolerated by the brain than when poured out rapidly as from the middle meningeal artery. It is exceedingly difficult, if not quite impossible, to make a differential diagnosis between sinus and meningeal hæmorrhage in injuries of the sinuses without fractures, as is well shown in Buzzard's and Cunning's case.

When fracture exists, injury to the sinus quickly declares itself because of a profuse, dark, venous hæmorrhage, unless the depressed fragments of bone control it as they do in a large number of the cases. Even then the anatomical location should at least lead us to suspect it. The most marked difference between meningeal and sinus hæmorrhage is the slow development of pressure symptoms, and these are less in degree in the latter. Unconsciousness is less likely to occur in sinus injury, and if it does appear comes later than in arterial hæmorrhages.

Convulsions rarely occur because of the slow development of pressure. In injuries of the basilar sinuses it is even more difficult to differentiate, with the possible exception of the cavernous sinus.

When linear fractures or fissures are present, with or without an external scalp wound, the Roentgen plate is of great assistance in showing whether or not these fractures traverse the grooves occupied by the sinuses, or possibly they will show the location of a clot.

A late appearing, gradually progressive hemiplegia, with hemianæsthesia and hemianopsia,

unaccompanied by any semblance of convulsions, might point to a deep abscess, as in Buzzard's and Cunning's case, but these authors, Cushing, and others emphasize the reliance which can be placed upon the presence of *optic neuritis, an extensor plantar response*, and the *absence of the abdominal reflex* on one side, as evidence of an organic lesion.

PROGNOSIS

The prognosis depends on: 1. The quantity of blood lost before coming to treatment, and the complications coincident with the injury, such as laceration of the brain tissues and other (arterial) hæmorrhage. 2. The particular sinus injured. 3. Infection. 4. Air embolism.

If exsanguination has not occurred before the case enters the hospital, death rarely occurs as the result of hæmorrhage *per se*. However, in Wharton's collection of seventy cases, seven did die of hæmorrhage. The fatalities are more frequent in injury of the basilar sinuses. Speaking of this, Phelps (31) says (Ann. of Surg., xlix, p. 472): "There is no reason to believe that in such cases operation can be successful. The lateral sinuses alone are accessible for interference. The quantity of blood necessarily lost is large and the vicinage of the bulb is an added danger." It is probable that with the improved technique of Cushing (32), the low suboccipital bone flap (Trans. Southern Surg. and Gynecol. Asso., 1908, xx, 324–330), (New York Med. Jour., 1907, lxxxv, p. 105) and subtemporal decompression operation, more of these cases can be saved.

Accidental injury to the sinuses incident to operations for mastoid disease is rarely followed by fatal hæmorrhage. A thrombus or partial thrombus perhaps already exists, and hæmorrhage is easily controlled. The greatest danger here would be sepsis and pyemia. Infection, especially in the earlier cases, frequently caused death, either by meningitis or septic thrombus and pyemia. It is always a source of danger because of the manner in which the wound is produced and the uncleanliness of the penetrating or impinging body.

Air embolism has caused death in at least two cases. Genzmer, Bergmans (33) (cited by Wharton, l. c.). In one it was observed (34) (Guyes, Wien. Med. Woch., 1887, No. 38, 39) that considerable air entered without ill effect.

The low blood pressure, the result of hæmorrhage and shock, particularly favors the entrance of air in veins such as the dural sinuses, in which the walls cannot collapse, as elsewhere, but are held open by the unyielding dura which forms part of its wall.

Senn (35) (Prac. Surg. Text-book, p. 92), for the purpose of ascertaining the conditions which induce air embolism and which increase or diminish hæmorrhage, made a number of experiments on animals, which showed that position was a potent factor.

The sinus was opened when the head was raised. Blood flowed out slowly and when the first inspiration occurred air entered the sinus with a lapping or gurgling sound. The ear to the heart revealed a churning sound from the presence of air. When the head was lowered, the hæmorrhage increased, and on expiration bubbles of air escaped from the sinus. These maneuvers were continued for some time, with the same result, until breathing became labored, cyanosis extreme, and death approached or occurred.

In cases requiring immediate operation the low blood pressure can be overcome in a measure by position, stimulants, transfusion, Crile's elastic suit, or bandaging of the extremities.

In Wharton's collection, thirty-five per cent of all cases recovered.

Of 40 cases, longitudinal sinus, 16 recovered.
Of 26 cases, lateral sinus, 8 recovered.
Of 3 cases, cavernous sinus, 1 recovered.
Of 1 case, straight sinus, 0 recovered.

Of the cases I have been able to find since:

Of 15 cases, longitudinal sinuses, 14 recovered.
Of 3 cases, lateral sinuses, 1 recovered.
Of 4 cases, cavernous sinuses, 1 recovered.
Of 2 cases, transverse sinuses, not stated.

Though it is generally believed that occlusion of the longitudinal sinus by ligature will not be followed by any harmful results, the cases of Robert Thompson Stratton, in which it was ligated for the removal of a tumor of the falx, and that of Kammerer (36) (cited by Stratton, Ann. of Surg., xxviii, p. 161), who ligated it one inch from the torcular Herophili preliminary to removing a tumor, were both followed almost immediately by death.

Occlusion, or partial occlusion, may exist without any apparent interference with the brain. It is probable that the thrombus formed after packing only partially occludes the sinus, or if it does it soon becomes partially absorbed and the sinus gradually resumes its function.

A most interesting case illustrating how collateral circulation may be established when the longitudinal sinus is gradually occluded is reported by Drs. Phillips and Smith (37) (London Lancet, 1908, ii, p. 364).

A glioma of the cerebrum pressed upon and occluded the longitudinal sinus in two places near the vertex and just above the torcular Herophili. Emerging from the right parietal foramen was a large vein which discharged its blood into the veins passing backward to the occipital vein and into the superficial temporal veins. Another large vein and the main one emerged from the skull in the antero-mesial corner of the right parietal bone close to the sagittal suture. This vein was thin walled and on emerging from the skull passed into a large varicose mass alongside the upper end of the coronal suture. From this varix emerged two efferent channels. One large vein passed forward to the supraorbital vein, one outward to join the vessel from the parietal foramen, both discharging their blood into the superficial temporal veins. When the tumor pressed upon the longitudinal sinus the pressure became raised in the large vessels coming from the anterior half of the hemisphere to the parasinoidal sinuses. Pressure eroded the skull and the parasinoidal sinuses established an outlet into the scalp veins. The tumor pushed back the right hemisphere, which compressed the longitudinal sinus a second time at the lambda, and blood escaped at the parietal foramen. Some of the diploic veins also became greatly enlarged.

TREATMENT

The first indication for treatment in injury of the sinuses of the brain is to stop the hæmorrhage. If alarming, or even considerable oozing is present, this should be stopped by temporary pressure pending the proper preparation of the patient for operation.

The proper preparation consists in:

1. Treatment for shock and loss of blood by stimulants, transfusion, bandaging the extremities, or Crile's elastic suit. If the hæmorrhage is controlled by the depressed fragments of bone, there is no immediate hurry for operation until the patient has recovered from the shock, unless evidence of intracranial hæmorrhage and pressure symptoms already are present, or rapidly developing.

2. Shaving the whole head, thoroughly scrubbing and cleansing the scalp, and especially the external wound. Asepsis is of great importance here because infection is in most cases fatal.

The flap raised should not be excessively large, but sufficiently large to expose the injured sinus. The flap having been raised, the fragments of bone in the sinus should not be removed unless their removal gives sufficient exposed area to deal with and control the hæmorrhage from the lacerated sinus. If it should appear that their removal will not give sufficient room to do this, the trephine or rongeur should be used to remove more bone about the depressed fragments while they remain undisturbed. (The chisel and hammer should never be used in these cases.) Death from hæmorrhage will occur in many cases if this point is overlooked.

Having exposed the wounded area and removed the fragments of bone, one has a choice of several methods to control the hæmorrhage: 1. Gauze tampon or pack. 2. Forcipressure. 3. Ligature, circular. 4. Lateral ligature. 5. Suture.

The iodoform gauze pack has proven by far the most satisfactory and available method. It has been used in nearly all cases reported either alone or supplemental to some other method. All mention the large quantity of gauze that is usually required to stop the bleeding, but used as first recommended by MacEwen, in which the roof or wall of the sinus is packed into the channel, with a clear field and plenty of room to see what one is doing, then suturing the soft parts down over it to keep it in place, I think a lesser quantity of gauze can be made to suffice.

The danger of too much gauze blindly packed is, first, further injury and laceration of the sinus and brain tissue, and, secondly, pressure on the cortex. The latter is not so serious, as the pack can be soon removed.

Forcipressure has been almost as generally used as gauze, but with less satisfactory results, and I think very much more danger. About the only advantage of the clamps or forceps is the speed with which they can be applied.

The disadvantages are: (*a*) The greater exposure of the sinus that is necessary to safely apply the clamp. (*b*) The necessity of some-

times opening the dura on either side of the sinus through which to pass the jaws of the forceps. (*c*) The danger of forcing the forceps into the brain tissues, or further tearing the sinus as the patient throws the head about after the operation. These patients are often semiconscious or delirious as the result of the injury. (*d*) The danger of infection following the instruments down through the dressing to the wound.

Stratton (38) (Ann. of Surg., xxviii, p. 161) points out that, if used, the clamps should be: 1. Of light weight. 2. Having short handles. 3. Made of non-corrodible material. 4. Constructed so as to permit of gradual closure.

3. Ligation. Occlusion by circular ligature "presents definite dangers in itself," as shown in both Stratton's and Kammerer's cases (loc. cit.). Stratton points out the danger of injury to the cerebral and pial vessels in attempting to pass a ligature about the sinus when the dura is not open, so that one can see what one is doing. Also the danger of tearing the dura or compressing the brain as the ligature is tied. Ligation is available in certain cases where full exposure and visual guidance are possible. It has been shown that while collateral circulation easily establishes itself when occlusion takes place gradually, sudden occlusion is often attended by serious and fatal results. The low degree of blood pressure, the result of loss of blood, feeble heart action and shock, favors a tendency to stasis of a marked degree.

4. Lateral ligature, so satisfactory in wounds of vessels in other localities, is much less so here because of the unyielding dural wall and consequent danger of the ligature slipping. It may, however, be successfully used in small tears of the sinus.

5. Suture would seem the ideal method, but it is not easy of application here because of the terrific hæmorrhage and difficulty with which it can be controlled while placing sutures. Silk or catgut suture has been employed in cases by Parkes, Krause, Novratal, LeConte, Senn, Cushing, and others with good results. It is probably most applicable only in small longitudinal wounds and in cases freely exposed and the hæmorrhage controllable at either side of the tear by small gauze plugs while suturing.

The late Nicholas Senn (39) proved by experiments on animals (Senn's Pract. Surg., 126) that suture of a transverse cut or tear in the longitudinal sinus was practically impossible because the tension required to approximate the retracted and unyielding dural wall was so great that the sutures cut through in every instance. He also showed in the same series of experiments that under favorable conditions longitudinal wounds in the sinus could be sutured. The great advantage of the suture or ligature is that the scalp can be entirely closed unless there is some other contraindication for so doing. The thrombosis following suture will probably be less or only partial.

CONCLUSIONS

1. I believe, with Wharton, that injuries of the great sinuses of the brain, being followed by a high mortality from hæmorrhage, venous stasis, air embolism, and infection, should be classed as dangerous injuries.

2. Without fracture it is practically impossible to make a positive diagnosis of injury of the venous sinuses, but with symptoms of intracranial hæmorrhage an operation guided by local conditions and possibly by radiographs is indicated.

3. As life or death is often determined by the amount of blood lost at the operation, and as in more than half the cases reported the hæmorrhage was fairly well controlled by the depressed fragments of bone, in the absence of intracranial hæmorrhage or serious pressure symptoms, these fragments should not be disturbed until the patient has recovered from the shock and loss of blood by stimulation or transfusion (or Crile's suit), or both, and until the bones about the depressed fragments have been removed broadly enough to give free control of the field.

4. The ideal treatment of the tear in the sinus is suture or ligature, when applicable, but the gauze pack, intelligently applied, should be used when every drop of blood counts for the recovery of the patient.

DEPARTMENT OF TECHNIQUE

BONE TRANSFERENCE

With Report of a Case

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THIS young man, a farmer's son aged eighteen years, gives the following history; In April, 1899, he had an attack of acute infective osteomyelitis involving the left tibia. His doctor, after three weeks' attendance, advised operation; he was taken to a hospital where, he says, a piece of bone nine inches long was removed from the leg. Ten weeks later the wound had healed.

In June, 1906, seven years after the onset, he was admitted to St. Boniface Hospital. I regret that I have neither photograph nor skiagraph to illustrate the condition as it was at that time. For six years he had been getting about with the aid of crutches, able to bear part of his weight upon the left leg. As a consequence the foot was much inverted, the sole looking almost horizontally inward and the outer border resting on the floor. The diaphysis of the tibia was entirely absent except for a conical piece of bone at either end, one attached to the upper epiphysis with its point directed downward, and the other attached to the lower epiphysis with point directed upward, each piece being one and one-half to two inches long. So far as could be determined by palpation the intervening space of about six inches in length was devoid of osseous tissue.

The fibula felt much thicker than normal and its lower end was bent inwards to suit the inverted position of the foot. In standing, the tip of the external malleolus rested upon the floor. The distance between the tip of the internal malleolus and the upper border of the internal tuberosity of the tibia was three and one-half inches less than on the sound side. This shortening resulted from the inversion and the downward displacement of the fibula. Shortening of the muscles and the bowing of the lower end of the fibula prevented the foot from being straightened. The leg was smaller and its muscles less plump than those of the right side. A large scar marked the site of the previous operation.

On June 26, 1906, operation was carried out as follows: Just external to the original scar, an incision was made from the upper tibial epiphysis to the lower, the full length of the limb. Each conical stump was isolated and its point removed by saw, leaving a flat surface of a diameter about equal to that of the fibula. The fibula was then exposed and sawn through at points opposite to the ends of the stumps and the segment moved forcibly over into a sulcus prepared for it by a little blunt dissection. One silver wire suture held each end in apposition to the stump of the tibia. The wound was closed and the leg put up in a plaster cast. Healing occurred without complication. He left the hospital at the end of seven weeks. Shortening then amounted to three inches. The half-inch gain in length of the tibia was secured by forcible traction and eversion of the foot during the operation. In September, 1906, three months after operation, he was able to walk

on the leg. A patten was then attached to the boot to overcome the shortening. It was too high and he found that he got round better without it and so discarded it. A patten of suitable height, I believe, would be an advantage. The final result is all that could be expected. It was feared that the operation by permitting movement of the external malleolus might result in weakening of the ankle joint. He says, however, the joint has never given any trouble and the leg is as strong in every respect as the other leg. This skiagraph, taken a few days ago by Dr. Bond, shows why the external malleolus remains firm; the upper end of the fibula has become united by osseous tissue to the junction of the lower tibial stump with the lower end of the transferred segment. The curve acquired by this portion of the fibula allows this to occur without at the same time necessitating outward tilting of the malleolus. The skiagraph also shows that the upper end of the transferred segment has been displaced outward and has formed bony union with both tibia and fibula. Motion at the ankle joint is considerably less than normal. I am unable to say whether or not this existed previous to operation.

Unfortunately total destruction of the diaphysis of a long bone is still a frequent result of acute osteomyelitis. Too many cases are still being mistaken for rheumatism until the period for efficient treatment has past. That period is within the first forty-eight hours. In few conditions is early diagnosis so important. Fortunately, nature rarely fails in her efforts to reproduce a new shaft. Only once before have

I met with such failure; this was in 1890 in a child of seven years, in whom acute osteomyelitis had destroyed the whole of the shaft of the humerus. Six months after the onset the case was brought to me with the dead diaphysis protruding half its length from the tissues of the lower part of the arm. A little traction sufficed to remove it. I saw this case six years later and found no evidence of new bone formation. The arm was about one-third normal length, quite soft and pliable, yet the degree of function retained by the limb was quite surprising, and I was glad that my advice in favor of amputation given some six years before had not been accepted. Failure to regenerate new bone may be due to destruction of the periostium by the suppurative process or to the careless tearing away of the membrane by the surgeon during removal of the sequestrum.

The literature of bone transference is not large. Only three cases of complete transference of a segment of the fibula to take the place of the tibia have been reported. In 1900 Professor Goldman of Freiburg (Lancet, January 13, 1906), after resecting a segment of the tibia for sarcoma, repaired the defect by substituting a segment of the fibula, wiring the ends as I did in this case.

The second case was by Thomas W. Huntington of San Francisco (Annals of Surgery, February, 1905), and the third by J. S. Stone of Boston (Annals of Surgery, October, 1907). Both were done for the repair of defects following acute osteomyelitis. In each case the surgeon first transferred the upper end of the fibula only, but owing to inversion of the foot found it necessary to transfer the lower end later. In Huntington's case this second operation was done nine months, and in Stone's case six months, after the first operation. A fourth case, in which only the upper end was transferred, was reported by A. E. Codman of Boston (Annals of Surgery, June, 1909). In this case "partial union" of the lower ends of the two bones prevented inversion of the foot and rendered transference of the lower end unnecessary.

In these cases, as in my own, the operation gave good results. It is easy of performance and satisfactorily meets a definite indication.

I see no reason for dividing the operation into two stages. As there is no need of disturbing its covering of soft tissues, and as the transferred segment carries with it the chief nutrient artery of the fibula, its vitality is not endangered.

THE TECHNIQUE OF THE OPERATION OF "POLE LIGATION" FOR BASEDOW'S DISEASE

By J. H. JACOBSON, M. D., Toledo, Ohio

At the meeting of the Mississippi Valley Medical Association held at St. Louis, September, 1909, a preliminary report was made on the results obtained from an operation for Basedow's disease which was designed to limit the amount of blood going to and coming from the gland, and in particular to check the absorption of thyroid secretion by way of the lymph apparatus. The operation was first suggested by M. Stamm of Fremont, Ohio, and consists in the application of a ligature around the upper horns or poles of the thyroid and was therefore called "pole ligation." This report was published as "Primary Bilateral Ligation of the upper poles of the Thyroid Gland for Exophthalmic Goiter," in the Cincinnati Lancet-Clinic for Feb. 5, 1910. It is also described in Ochsner and Thompson's book, "Thyroid and Parathyroid Glands," St. Louis, 1910. The last communication on this operation, by the author, appeared in the Ohio State Medical Journal for Aug. 5, 1910, entitled "A further consideration of 'pole ligation' for Basedow's disease."

Detailed information regarding this operation, with case reports, will be found in the above com-

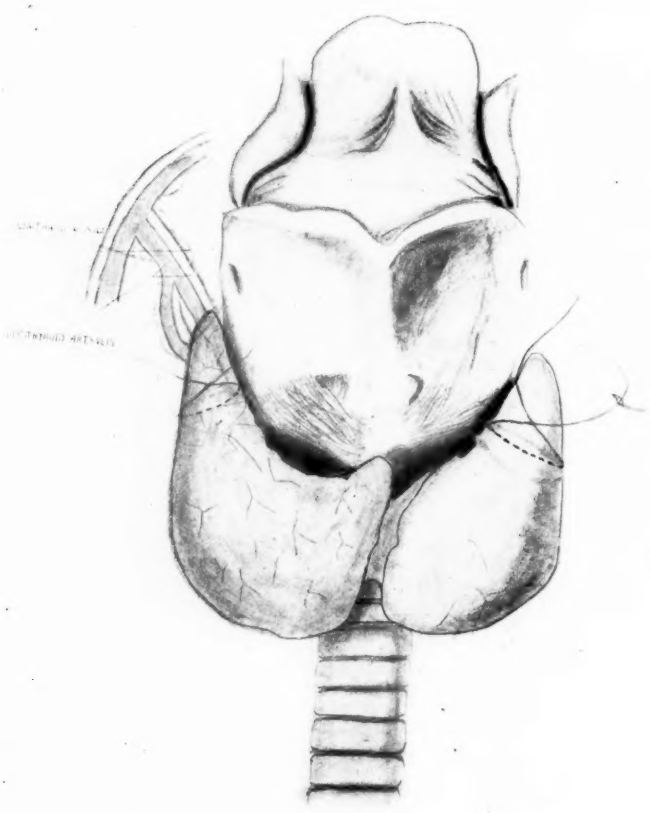

Fig. 1. Thyroid gland showing position of ligatures on the upper poles.

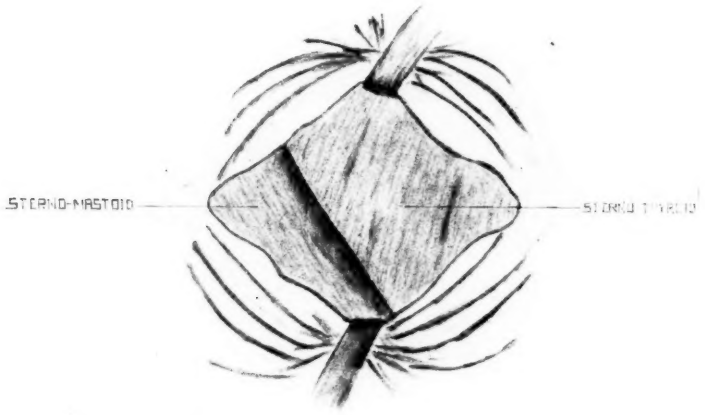

Fig. 2. Retraction of skin incision showing sterno-mastoid and sterno-thyroid muscles.

munications. The present description of the method is made on account of the number of inquiries which the author has received for further information regarding the technique of this procedure.

In the preliminary report the following conclusions were made:

1. Ligation of both poles of the thyroid gland acts first by diminishing the blood supply to the gland, and thus diminishing immediately its activity; secondly, by directly diminishing and preventing the gland secretion from entering the general circulation by way of the main lymphatic channels and causing a subsequent atrophy of the gland itself.

2. The operation of "pole ligation" is much easier to perform than ligation of the thyroid vessels, and may be as effective as a partial thyroidectomy.

3. It does not disturb the blood supply of the parathyroid glands, nor endanger the recurrent laryngeal nerves.

4. Theoretically, at least, and from the simplicity of its performance, it would seem that "pole ligation" should entirely supplant the operation of simple ligation of the thyroid vessels in Base-

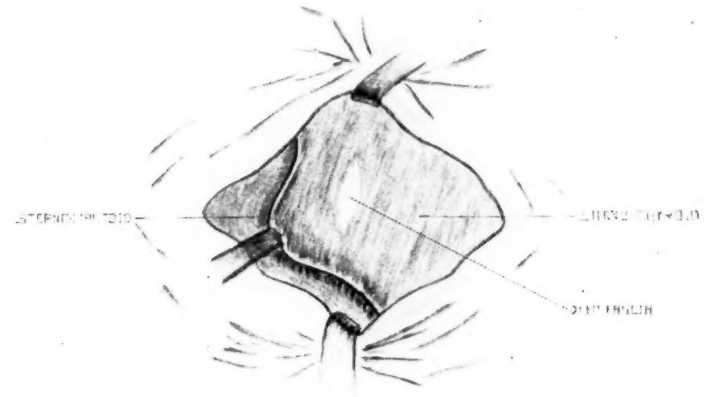

Fig. 3. Retraction of the sterno-mastoid muscle and exposure of the deep fascia.

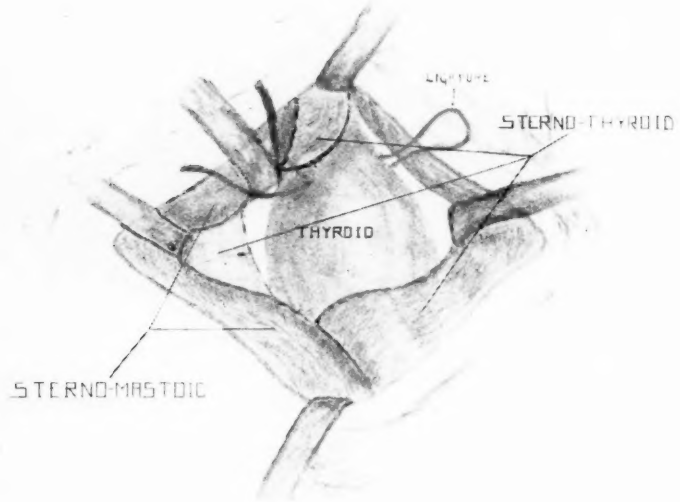

Fig. 4. The deep fascia is incised and the thyroid gland exposed. The ligature shown in place.

dow's disease, and in many cases the necessity of partial thyroidectomy.

5. As a preliminary operation to partial thyroidectomy for Basedow's disease, it will be found of great value.

6. At the present time we are warranted in saying that "pole ligation" offers the prospect of cure in many cases, and of lasting improvement in others.

7. The operation of "pole ligation" is a safe one, and in skilled hands should have no mortality.

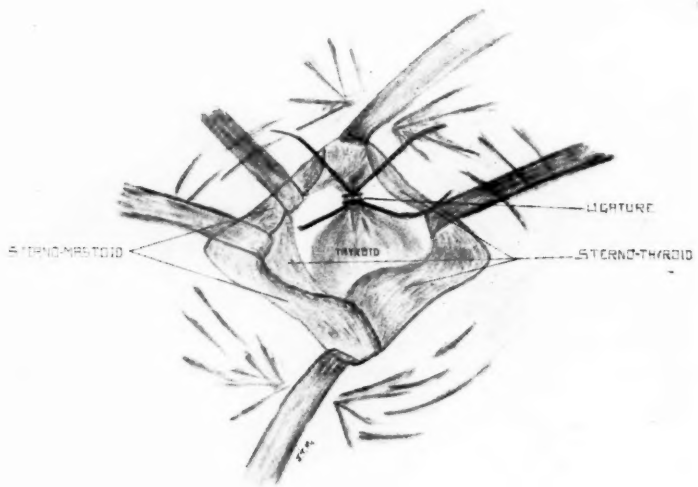

Fig. 5. Ligature tied in situ.

The subsequent experience which we have had with this operation has shown these conclusions to be correct.

TECHNIQUE OF OPERATION

The method consists in doubly ligating both upper horns of the thyroid gland (Fig. 1) and is carried out as follows: After carefully palpating and determining the position of the upper pole of the right lobe, either a transverse or an oblique skin incision is made directly over it. The incision is one and one-half inches long and extends through the skin, superficial fascia, platysma, down to deep fascia, when the inner border of the sterno-mastoid muscle can be seen (Fig. 2). The inner border of the sterno-mastoid is then loosened, raised and retracted, exposing the fibers of the sterno-thyroid muscle which run in the opposite direction to those of the sterno-mastoid. These fibers are separated for about one inch, the deep fascia covering the thyroid will then be exposed (Fig. 3). This fascia is next divided, and the capsule of the gland brought into view. The muscles are well retracted by blunt hooks. A ligature carrier or a large curved pedicle or aneurism needle is used to pass the ligatures. The material used for ligation has been mostly linen or silk (Fig. 4). Theoretically it seems that heavy black linen on account of its slowness of absorption is best.

In passing the ligature around the upper pole on the right side, the blunt needle is passed from within out, while upon the left it is passed from without in, after first freeing and raising the pole somewhat by blunt dissection.

Theoretically at least, it seems that the ligatures should be placed extra-capsular, for the reason that the lymphatic vessels of the gland parenchyma empty into the lymphatics contained within the capsule, and that the extra-capsular ligature will more effectually stop the gland excretion.

Some little resistance may be encountered in passing the blunt needle about the pole; this, however, is quickly overcome. When the blunt point of the needle has been passed, the ligature is grasped and the instrument withdrawn. By cutting the loop, we have two ligatures surrounding the gland pole. These are carefully separated and tied, leaving a space between them of from one-fourth to one-half inch (Fig. 5). Immediately after ligation the gland tissue in the vicinity of the ligature becomes blanched.

The closure of the wound consists in the approximation of the muscles by one or two interrupted catgut sutures, followed by approximation of superficial fascia and skin.

The operation of "pole ligation" may be used in combination with other operations on the thyroid gland for the relief of exophthalmic goiter. It may be used in conjunction with the pressure atrophy operation of Werelius, with partial thyroidectomy in which the ligation of the pole is made on the remaining lobe, and also in combination with ligation of one or both inferior thyroid arteries.

A MODIFIED VISCERA FORCEPS

By A. J. SCHOENBERG, M. D., Chicago, Illinois
Surgeon to Evangelical Deaconess Hospital; Instructor in Gynecology, College of Physicians and Surgeons

THE instrument shown in the accompanying illustration is a modification of a forceps devised by Dr. Barrett of this city (Journal A. M. A., Oct. 31, 1903).

It will be readily seen that the writer's forceps possess the advantage of simplicity. There are no parts of it that can be lost or that may need repair at an inopportune moment.

The holding portion of the forceps consists of rubber covered incomplete rings, which permit rubber tubing to be put on or removed, when replacing becomes necessary. The tubing for covering the rings should be snug fitting and so cut that it will be long enough to go well around the incomplete ring, thus forming a complete loop.

The jaws of the forceps meet and lightly compress each other when closed at the first catch on the handle, and when closed to the third or fourth catch the hold is firm.

These forceps may be made use of for catching and holding the tube, ovary, round ligament, bowel, uterus, or any of the abdominal viscera without injury to the delicate peritonium. It may be used to advantage in picking up an appendix through a small incision, or holding a bound-down, gangrenous appendix after slightly liberating it from its bed of adhesions. Thus the appendix can be ligated and removed with greater ease through a smaller abdominal opening, and when dealing with an acutely inflamed appendix or tube with less disturbance to the protective adhesions.

By the aid of these forceps, then, the intra-abdominal work can be done with greater ease, through a smaller opening, with less intra-abdominal handling, and with no injury to the delicately covered structures.

PERITONEAL DIRECTOR

By W. F. CHURCH, M. D., Greeley, Colorado

IN emergency operations on the abdomen the surgeon frequently finds the intestines so distended with gas that after the primary opening or nick is made in the peritoneum, they press and crowd into the opening to such an extent that enlargement of the incision is somewhat difficult with the loss of valuable time. In fat subjects under good conditions the ordinary method of cutting between two fingers is more difficult than in persons with thin abdominal walls.

To save time under these conditions I devised a simple instrument called a peritoneal director. As seen in the cut this consists of a flat-spoon director with a handle at right angles so shaped that three inches of fat in the abdominal wall will not interfere with its being easily inserted and held in a proper

position. Its use is readily acquired. After the initial incision is made in the peritoneum the director is inserted in the cut and pushed along the line of the proposed incision close to the under side of the peritoneum, which is cut rapidly with scissors or knife.

In sewing the peritoneum this instrument can be used for the same purposes as the Beck spoon, and acts better in fat subjects for it can be held level, which is impossible with the latter instrument.

The advantages of the peritoneal director may be stated briefly as follows:

1. It is safer than the usual method in enlarging the primary opening in the peritoneum.
2. It saves time.
3. It can be used to keep back intestines in closing the peritoneum.

SIMULTANEOUS USE OF COTTON AND RUBBER GLOVES IN OPERATIONS

By J. J. BUCHANAN, M. D., Pittsburgh, Pennsylvania

ABOUT four years ago, the writer had an attack of acute eczema of the back of the hands, probably brought on by excessive use of the hand brush and corrosive sublimate solution, one hand having been made tender by an X-ray burn of the first degree of many years' standing. The watery discharge from this eczema, together with the apparent impossibility of curing it while constantly washing in water preparatory to operation, threatened to put a stop to the writer's operative work, till it was suggested by Dr. William B. Ewing, dermatologist, of this city, that the hands might be washed thoroughly with liquid soap without water, and thin white cotton gloves worn under the usual rubber ones during operation. This plan was put into effect and, together with the free use of pure pine tar, soon put an end to the eczema.

The writer, by this time, had found that tactile sensibility was but little impaired by the extra pair of gloves, and has ever since continued to use them in all operations.

The advantages are considerable:

1. Excessive scrubbing and any use of antiseptic solutions for the hands may be safely discarded. (It is, of course, understood that the surgeon never, under any circumstances, soils his hands with pus.)

2. Even in the longest operations, perspiration is absorbed by the cotton gloves and is never free to pass through unnoticed needle punctures in the rubber gloves.

3. Accidental punctures of the rubber gloves are nearly always discovered by the staining of the white gloves by the inward passage of blood.

4. The hands are little or not at all moist when the gloves are removed.

5. The hands are kept remarkably free from small pustules or other infections.

6. Should such occur, the patient is always safe from infection, by reason of absorption of discharge by the white glove, even should an unnoticed needle puncture of the rubber one occur.

The white cotton gloves used by the writer are of the thin sort used by undertakers. They are washed after use, dried, and sterilized with the gauze pads. The rubber gloves also are dry sterilized in individual packets. Both pairs of gloves are put on dry on hands dried with a sterile towel, and the donning of the rubber gloves is facilitated by covering the white gloved hand with sterilized talcum powder.

The writer is convinced by this extended experience that danger of infection from the hands is completely eliminated by the combined use of the white cotton and rubber gloves.

WIRE CARRIER FOR BONE SUTURE

By J. J. BUCHANAN, M. D., Pittsburgh, Pennsylvania

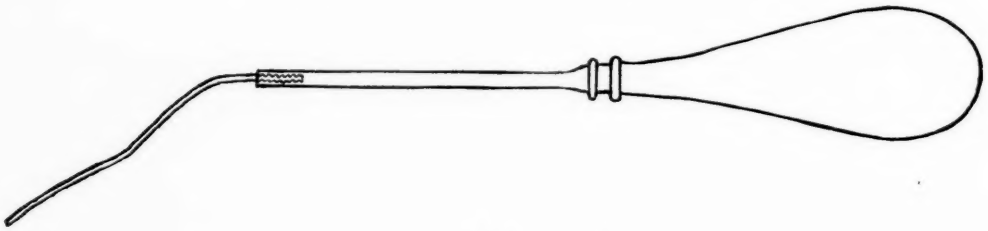

Fig. 1.

THE original device illustrated below obviates the difficulty, formerly experienced by the writer, in withdrawing the wire from the deep surface of a fractured bone, without too much displacement of fragments, during the process of wiring. It consists merely of a cylindrical carrier, just large enough to slip easily through the drill hole, with a pit drilled upward into its tip for the reception of the wire, in the walls of which pit is cut a thread.

In wiring a bone after the drill holes are made, the wire is passed from without inward through one fragment in the usual manner. A slight bend or hook is given the inner extremity of the silver wire, so that it shall present at the inner end of the other drill hole. Through this drill hole the carrier is passed and, by being revolved by the fingers against the projecting inner end of the wire, steadied with a forceps, the inside thread easily cuts a corresponding screw thread on the soft wire, which after a few turns, becomes firmly fixed to the carrier and can be easily withdrawn.

This device was suggested by a needle used to some extent a number of years ago when silver wire was popular as a suture for soft parts. It has been made for me in two sizes by Feick Brothers of this city.

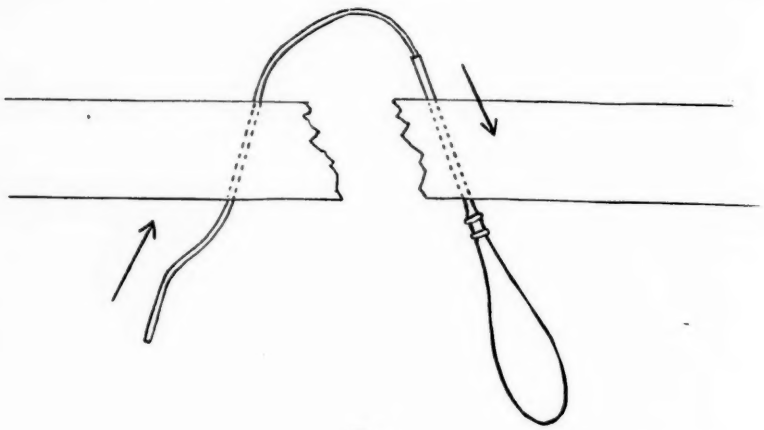

Fig. 2.

TRANSACTIONS OF SOCIETIES

AMERICAN ASSOCIATION OF OBSTETRICIANS AND GYNECOLOGISTS

TWENTY-THIRD ANNUAL MEETING HELD AT SYRACUSE, NEW YORK, SEPTEMBER 20, 21, AND 22, 1910. THE PRESIDENT, DR. AARON B. MILLER, SYRACUSE, IN THE CHAIR

PRESENT STATUS OF THE COLON TUBE

DR. H. WELLINGTON YATES, of Detroit, Michigan, in connection with his paper showed skiagraphs, first of all, to prove that fluids injected into the rectum were carried to the cecum. Second, that no device was necessary for this end except a small make catheter. Third, that within ten minutes this fluid could be skiagraphed in the cecum. Some of these pictures were taken with the patient in a dorsal position, some in the ventral, and some in Fowler's position. The mixture was always injected by a small rectal tube or large male catheter inserted five inches. If done slowly, no trouble was had in injecting one quart even in the smallest subjects.

His observations and conclusions were: 1. Seldom if ever were soft rubber tubes admitted into the normal colon. 2. When an endeavor was made to force the tube upwards even by the gentlest manipulations, it was found to coil itself up in the rectum and there did positive harm because of pressure irritation and the consequent inability to retain the enema. 3. In perhaps half the instances it was impossible to tell when the tube was coiling up on itself even when they suspected it. 4. Colon tubes as such were of no value because they did not reach the colon and they were mischievious in that proportion as they endeavored to force them high up. 5. Water or fluid injected four or five inches into the rectum was carried upward into the colon and might be found at the cecum in ten minutes. 6. There was good reason to believe that a reversed peristalsis was set up when fluids were injected into the rectum. 7. The introduction of a tube more than five inches for colonic irrigation or therapeutic enemata was useless and likely to defeat the object desired.

DISCUSSION

DR. LEWIS S. MCMURTRY, Louisville, Kentucky, stated that he presumed that the experience of every member was like his own, that they satisfied themselves several years ago that they were practicing a deception upon themselves by the use of what was called high enemata. It had been discovered that what they formerly called high enemata were not high enemata; that if they introduced a soft rectal tube into the bowel and kept on passing and passing the tube it reached to the sigmoid and then began to coil upon itself and it did not pass into the bowel, so that years ago he abandoned all efforts at what was known as high enmata, recognizing that it was a deception. It seemed this had an important bearing upon some important features of treatment of the colon, especially ulcerative conditions. For instance, if they opened the cecum they could irrigate the colon from below or above, but if they had no opening in the caput coli they would find that it was almost impossible with the patient in any position, even inverted or in Hanes' position, to get water up into the transverse and ascending colon, but if they had an opening there and they threw water in the gas would pass out of the opening in the cecum and gave them a means of medicating the entire mucous surface of the colon, but without such an opening it was impossible to do it.

DR. J. GARLAND SHERRILL, of Louisville, Kentucky, stated that it had been demonstrated by Dr. Hanes that fluids passed with difficulty into the colon and cecum because of the amount of gas that was found in this portion of the bowel, and if they had an opening in the cecum or appendix the gas would come out and fluid would go in. Dr. Hanes used coal oil in the treatment of amebic dysentery with gratifying results.

DR. LOUIS FRANK, of Louisville, wished to speak of the therapeutic value of injections of fluids for medication in bowel lesions situated high up, by the use of the inverted posture.

DR. FRANCIS REDER, of St. Louis, Missouri, stated that Dr. Soper and he had done considerable work in the field of rectal inflation and the injection of water into the lower bowel, endeavoring to get it as high up as possible, and they found that if they took an ordinary colon tube and introduced it into the bowel it was impossible to get above the

promontory of the sacrum. The ordinary soft tubes coiled on themselves and the fluids injected did not reach beyond what was called the shelf of the rectum.

DR. YATES, in closing, stated that he had proved conclusively that water did not pass the colon with the patient in the horizontal position. The purpose of his paper was to show the possibility of not only medicating the rectum, but the sigmoid and colon, with fluids.

DIAGNOSIS OF CHRONIC SURGICAL LESIONS IN THE UPPER ABDOMEN

DR. CHARLES N. SMITH, of Toledo, Ohio, in this paper stated that the diagnosis of these lesions was made with accuracy by the anamnesis alone. The differentiation of cholelithiasis from ulcer demanded the recognition of the initial symptoms which were frequently overlooked. The accepted symptomatology of cholelithiasis and ulcer was largely that of their terminal events. The most striking feature of ulcer was periodicity of painful attacks alternating with intervals of relief. As complications occurred the attacks were more severe, becoming nearly continuous. In cholelithiasis the stomach distress, compared with the pain of ulcer, was of much less intensity, occurred sooner after the taking of food, than was the pain of a full stomach, and did not progressively increase and reach its height in from two to five hours after meals. Cancer of the stomach was generally a sequence of ulcer, symptoms of the latter gradually merging into those of the former.

Vomiting might or might not be a dependable symptom in cancer. Anemia was a most important symptom. Chronic pancreatitis being largely a terminal event in cholelithiasis, the diagnosis of the former was facilitated by recognizing the initial symptoms of the latter. Valuable pancreatic symptoms were found in the feces. Chemical and microscopical examinations were necessary. Cammidge's reaction was of questionable value. In movable kidney during Dittl's crises, the swollen and tender kidney, especially when jaundice was present, might be mistaken for an inflamed and distended gall-bladder. Differentiation was to be made from appendicitis, rupture of the gall-bladder, and renal colic. The appendix might mimic successfully many of these lesions.

DISCUSSION

DR. ROBERT T. MORRIS, of New York, said they could not always make a diagnosis of the presence of gall-stones. They should not fall into the trap of speaking of cholelithiasis. They should not make that diagnosis. It was a dangerous thing. They should speak of cholecystitis, as the gall-stones were merely incidental to cholecystitis.

DR. JOSEPH PRICE, of Philadelphia, stated that if the internists made diagnoses in these cases early and referred them to surgeons for operation promptly, many more lives would be saved than are now saved.

DR. ROLAND E. SKEEL, of Cleveland, Ohio, said if one wished to secure so complete and certain a history as was necessary to make a diagnosis in the cases under discussion, unusually intelligent patients must be met with, but he did not see any possibility of the average patient giving such an accurate history of his case as would lead the surgeon to make a diagnosis from that alone.

PROBLEMS IN UTERINE CANCER

DR. WALTER B. CHASE, of Brooklyn, New York, first discussed the frequency, suffering, and mortality attending uterine cancer which were a sufficient argument why professional sentiment should be thoroughly awakened to the necessities of the situation. In the present state of knowledge, early extirpation of the uterus offered the best chance of cure. Where there was considerable involvement of the vaginal structures, the first indication was high amputation of the cervix and removal of the vaginal involvement. If the uterine stump did not heal, hysterectomy should usually be undertaken, providing there was normal mobility of the uterine body. Vaginal hysterectomy subsequent to cervical amputation was difficult if not impracticable. Fixation of the uterus, if not dependent upon other coexisting causes, contraindicated hysterectomy. Under such conditions accurate differentiation should be made. If the parametria were involved radical measures were contraindicated. When subsequent to the removal of the cervix and the vaginal growth hysterectomy was expedient, the abdominal route should be chosen because vaginal hysterectomy was neither easy nor practicable, and because there should be as little interference as possible with the remaining cicatrix. The value of hysterectomy for cancer of the body as a secondary operation, though not recognized by the average practitioner, had a value which could not be gainsaid in a certain class of cases. The writer objected to the palliative treatment of uterine cancer most in vogue, which consisted of the application of potent escharotics, both on account of the inability to limit the area of their destructive influences, and the violent pain attending their application. The thermo-cautery was the palliative measure par

excellence. The electric cautery left nothing to be desired, and if one was under the necessity of using a Paquelin, which was practically as satisfactory, it was hazardous to attempt the operation with a single apparatus. A variety of straight and curved platinum knives and hone-shaped instruments were needful. For securing the best results tact was needful in protecting the vaginal walls from excessive heat, and skill in removing all diseased structures compatible with the anatomical relations of the healthy and diseased structure. His results from the use of the thermo-cautery had been very satisfactory. The modus operandi of the thermo-cautery treatment seemed to be, first, its power to destroy or inhibit specific germs beyond the area of actual destruction of tissue; second, it closed the lymphatics, thereby limiting absorption; third, it promoted healing, diminishing hæmorrhage and purulent discharges; fourth, when the destruction of malignant growth extended to normal structure, it facilitated the advent of healthy cicatrization; fifth, by following the use of the cautery, by daily gentle irrigation with one of the creasol compounds, of not more than one dram to a quart, always avoiding peroxide of hydrogen, and dressing with oxyo-zinc gauze, the suffering was greatly lessened and sometimes almost wanting until the inevitable end; sixth, well authenticated cures had followed this treatment in which no expectation of cure was suggested.

Dr. Chase then spoke of the necessity of disseminating such information among women as would vouchsafe to them such an appreciation of the necessity of the situation regarding cancer as to lead them to seek assistance early. He also urged that public interest be awakened among philanthropic men and women, as had been done for those suffering from tuberculosis, so that facilities might be provided for the care of the numerous cases of uterine cancer in those without financial resources. He introduced a series of resolutions to that end and hoped that the society would consider these questions in a practical way, and he invoked the mature judgment, co-operation, and influence of the members in the formation of a plan and the promulgation of measures by which the condition of women with cancer would be ameliorated.

STATISTICS OF CANCER IN THE FEMALE

Dr. K. I. Sanes, of Pittsburg, read a paper based on some statistical data collected from the latest eight annual reports of the Bureau of Census and the latest reports of 219 hospitals.

The figures showed that the proportion of deaths from cancer to the total number of deaths from all causes were in females 1 to 17.7; in males 1 to 33.4; the proportion of deaths from cancer in the past thirty-five years to the total number of deaths in the past thirty-five years were, in females 1 to 9.8; in males 1 to 18.5. Taking the relative frequency of cancer in both sexes it was found that according to the mortality statistics of the United States Bureau of Census 62% of those that died of cancer were females and 38% males; according to the hospital statistics 66.5% were females, and 33.5% males. They saw that cancer was an exceedingly common disease in the female and it was met with about twice as frequently in females as in males. Whether based on mortality figures or population figures, there was clearly shown an increase in cancer from 1900 to 1908. In the eight years there was an increase in cancer mortality from 1 to 22.8 deaths to 1 in 16.6 deaths, or from 63 per one hundred thousand population to 74.3.

The question was frequently raised whether the gradual increase in mortality was not due to changes in the methods of reporting deaths and to the greater accuracy in the diagnosis of cancer, especially in view of the slight variation for the five years between 1903 and 1907.

Hospital statistics, if carefully and properly compiled, could be utilized to great advantage by the profession in many ways. The modern hospital organization and facilities, the gradual increase of the number of hospitals all over the country, the more general use of the hospitals by the sick, the greater readiness by the profession and patients to adopt surgical measures for surgical diseases,—all this made the hospital the most valuable source of statistical medical information. But to get accurate information, not only must each hospital have a careful, conscientious statistician, but the visiting members of the hospital staff must see that their diagnoses were carefully reported in the hospital records.

DISCUSSION

Dr. William H. Humiston, of Cleveland, Ohio, stated he had had but five cases of what was generally spoken of as inoperable cancer of the uterus, and in these he resorted to the Wertheim operation, making a very wide dissection, and of this number four were still living.

Dr. Ralph Waldo, of New York, stated there had been a decided advance in operative work for the treatment of cancer of the uterus. He believed to-day that most any one, who was competent to pass judgment, would advise a radical operation on any woman forty-five or fifty years of age, who had a persistent hæmorrhage from the uterus, unless there was a polypus or something of that kind

which he could thoroughly demonstrate was the cause of hæmorrhage. They would occasionally take out a uterus at that age which was not the seat of tumor, but they would take out many more uteri that were the seat of incipient carcinoma. Generally he preferred the vaginal route in operating on these cases.

Dr. Maurice I. Rosenthal, of Fort Wayne, Indiana, stated the early symptoms of cancer of the uterus were hæmorrhage and discharge, and when they got a case of cancer of the uterus in its early history it was a pure incident. The only saving clause they had was the fact that some carcinomata were less malignant than others, or some were more malignant than others, and when they were dealing with carcinoma of the fundus of the uterus they were ordinarily dealing with a carcinoma that was less malignant and a destructive operation through the vagina in such a case was uncalled for. When they were dealing with carcinoma of the portio vaginalis they were dealing with that form of cancer which was not so malignant. In such cases ordinary hysterectomy done with cautery would give as good results as any other method. When they were dealing with carcinoma of the portio uteri which began in the endometrium higher up, they were dealing with a serious malignant growth that practically no operation would do any good. He had done the Wertheim operation, and reported fifty-seven cases in the *New York Medical Journal* some years ago with good results in that class of cases.

Dr. J. H. Carstens, of Detroit, agreed with Dr. Rosenthal and Dr. Waldo that it was largely a question of early diagnosis. When a woman had cancer which was so far advanced that the lymphatics and other structures were involved, it was better to let her alone and trust to the *vis medicatrix naturæ*.

Dr. Thomas B. Noble, of Indianapolis, looked upon cancer of the cervix or of the uterus as an analogue to carcinoma of the breast. It should be so considered and diagnosticated, and decidedly so with regard to treatment.

Dr. Joseph Price, of Philadelphia, looked upon the vaginal operation as one of the simplest in surgery, but in operating for the removal of carcinoma of the uterus where the structures were involved and wide, and deep dissection was necessary, it was better to operate through the abdomen.

Dr. Francis Reder, of St. Louis, Missouri, stated the whole question resolved itself into early diagnosis, skilled operative measures, and education of patients.

Dr. Edward J. Ill, of Newark, New Jersey, stated in operating for cancer of the uterus no surgeon could open up an extensive area of cellular tissue without spreading the cancer cells. The safest operation, where there was any extent of cervical carcinoma, was to start from above, separate all adhesions, separate all attachments to the uterus and to its surroundings, and then go from below and lift the mass right out and cut it off with a cautery, as had been suggested by Werder.

TREATMENT OF OBSTRUCTION OF BOWELS DUE TO MALIGNANT NEOPLASM

Dr. Maurice I. Rosenthal, of Fort Wayne, Indiana, in this paper reported advanced cases of carcinoma of the bowel treated by simple anastomosis without resection. He spoke of the advantages of this method in such cases. He described a method by which anastomosis was accomplished before the bowel was actually opened, making the bowel suture aseptic. He described the operation in detail, illustrating each step. No new or complicated instruments were required. He spoke of the advantages of the Murphy button in situations that were not sufficiently accessible for this operation. He reported cases of radical resection of the malignant bowel and spoke of the futility of resection unless it could be done radically. He gave the general results from operations for cancer of the bowel as shown by a review of 328 cases from the literature.

His conclusions were as follows: 1. Obstruction of the bowel due to carcinoma was not hopeless as to cure by radical operation. Incomplete excision of all cancerous tissue must necessarily result in recurrence of the growth. 2. Anastomosis without resection of the malignant growth should be the operation of election in obstruction due to cancer, where the radical operation, that was complete excision, was impossible. 3. Anastomosis without resection low in the pelvis, where the bowel was accessible with difficulty, could be successfully accomplished by the assistance of the Murphy button. 4. Anastomosis without resection probably bore the same relation to cancer of the bowel as did gastro-enterostomy to cancer of the pylorus. 5. The clamp and suture method of bowel anastomosis as described was practical, rapid, and trustworthy, and applicable in a large variety of bowel cases requiring resection or anastomosis.

DIAGNOSIS OF TUBAL ABORTION AND RUPTURE

Dr. Charles E. Congdon, of Buffalo, New York, stated the general indication for operative interference as promptly as possible could not be gainsaid. Schauta, for example, after a careful study of the literature, collected 123 operative

cases, with a mortality of 5.7% and 121 cases treated palliatively, with a mortality of 86.89%, although in another series of more carefully selected cases, he found the mortality by palliative treatment to be only 65%. To recapitulate the diagnostic features he would say that (1) there was sudden pain, nearly always, the exceptional cases being those with sudden collapse, as in two cases which he reported in July, 1909. (2) Uterine hæmorrhage occurred within forty-eight hours after the initial pain. This symptom and sign was common to all cases of rupture or abortive tubal pregnancy. (3) Add collapse, and the diagnosis was complete. If collapse was lacking or slightly marked, it was on account of gradual internal hæmorrhage when on examination the cul-de-sac would show a progressive bulging.

RESULTS AT LEBANON HOSPITAL OF DEFERRED OPERATIONS FOR EXTRAUTERINE PREGNANCY

DR. RALPH WALDO, of New York, stated they had had many patients brought into the hospital in a very desperate condition, and out of the eighty-one cases that he reported there had been but three deaths. It was thought that two or three patients would die in the ambulance. They were freely stimulated and reached the hospital moribund. At no time after reaching the hospital would they have stood an anæsthetic or the slightest operation. Autopsies proved the diagnosis of ruptured extrauterine pregnancy to be correct. The third patient who died was one of these unfortunate cases that were occasionally met with by all surgeons, where the patient was making an absolutely normal convalescence, when she suddenly died from pulmonary embolism. Seventy-eight other cases were operated on by the abdominal route, and recovered.

After a severe hæmorrhage another did not take place in less than from a week to ten days. In from two to seven days, depending upon the condition, the abdomen was opened from above. The clots and free blood were rapidly removed with the hand and dry gauze sponges, but the abdominal cavity was never irrigated. Formerly, where the patient had lost a large amount of blood they put a quart or two of normal saline solution in the abdominal cavity, and left it there to be absorbed. More recently this saline had been given in rare instances in the cellular tissue by hypodermoclysis, or more frequently in the rectum. In one instance only in the above cases was the abdomen drained; in all others it was closed. The entire operation required from eight to twenty minutes. He preferred the abdominal route because the operation could be performed much quicker and when the mass was high up and the vagina small, much better. It might be well for him to state that he performed many operations on the tubes and ovaries through the vagina. He was not prejudiced in favor of the abdominal route.

DISCUSSION

DR. L. F. SMEAD, of Toledo, Ohio, stated a woman, twenty-five years of age, was brought to him with a diagnosis of ectopic pregnancy. This was her second pregnancy. Her first pregnancy was cared for by a physician who brought the case to him so that they knew the exact condition. At the same time there were no abnormal symptoms. The history of the case was that for two or three days there was slight pain in the right side, and during the night preceding the day upon which he saw her there was a slight flow. There was no tenderness in the abdomen particularly, and on vaginal examination he found a slight mass over the right cornu of the uterus. The things he considered were these: *first*, he considered it possibly tubal with a slight rupture into the broad ligament, *second*, interstitial pregnancy in the cornu, and, *third*, he considered the possibility of a simple development of the placenta in the right horn of the uterus. The uterus was fully as large as it should be at about three months. As the examination was quite satisfactory with her abdominal muscles quite relaxed, he decided later that probably a threatened abortion was taking place with the placenta in the right cornu of the uterus, and he decided to treat the case in that light, as he was not anxious to open the abdomen in a normal pregnancy or overlook interstitial pregnancy in the cornu of the uterus. Two months have elapsed since he saw her. The symptoms had disappeared and apparently a normal pregnancy was progressing.

DR. H. W. LONGYEAR, of Detroit, stated this matter of deferred operation in extrauterine pregnancy in the presence of shock had been threshed out in this association several times and if he remembered rightly the consensus of opinion had been decidedly in favor of immediate operation. It was his opinion that operation should be done in these cases even in the presence of extreme shock. He knew of no other class of cases in which they waited in the presence of hæmorrhage for shock to cease. They operated primarily for the stoppage of hæmorrhage, and to wait for shock to cease in some cases would be fatal.

DR. J. H. CARSTENS, of Detroit, stated that Dr. Longyear had struck the keynote. If they had a hæmorrhage from a leg that had been cut off, they did not wait for shock to subside, but they stopped

the hæmorrhage. He believed in operating on these cases promptly.

Dr. William H. Humiston, of Cleveland, Ohio, had had an unusual record in cases of ruptured tubal pregnancy, that was, he had yet to have his first fatal case, and he operated on them as soon as he could get them ready for operation and get his instruments there and assistants. He did not care what condition the patient was in, whether in shock or not.

Dr. Henry S. Lott, of Winston, North Carolina, wanted to emphasize the character of the pain. Several times he had made a diagnosis of ectopic pregnancy in the early weeks by sitting by the side of the bed of the patient and watching her for several hours, and the pain was always recurrent, rhythmic, and explosive, whereas if the appendix was the seat of trouble the pain was continuous without intermissions, and very often without remissions.

Dr. J. Garland Sherrill, of Louisville, agreed with Drs. Carstens and Humiston. If they had a ruptured vessel internally they considered it one of the most dangerous forms of hæmorrhage they had to deal with. If they had a case of gunshot wound of the abdomen they would not wait to open that abdomen. The same course therefore should be pursued in cases of ruptured extrauterine pregnancy.

Dr. E. Gustav Zinke, of Cincinnati, Ohio, stated there were exceptional cases. Extrauterine pregnancy was not always the same in every case. Some of these patients recovered without operation. They found these symptoms when they operated for other conditions. Tubal pregnancy terminated in three different ways, namely, tubal abortion, and the ovum became absorbed and an operation was not necessary by any means in every case. Then they had a rupture between the layers of the broad ligaments, and they had a ruptured tube into the peritoneal cavity. In the case of rupture between the layers of the broad ligaments they had a well defined tumor form. In the case of rupture into the peritoneal cavity they had sudden shock and all the signs of internal hæmorrhage, and that was a case in which prompt action was indicated, and it was for the operator to decide whether an operation should be performed at once or whether he had time to wait. In those cases in which the tube ruptured into the peritoneal cavity with severe hæmorrhage with all the symptoms of shock, in which the picture was complete, they did not see the patients in the hospital, but usually at their homes or in places where opening of the abdomen was prohibited. It would mean death to operate at once, because the surgeon was not prepared and the patient was not prepared. Experience had taught us that by putting these patients in the recumbent position and keeping them there with an icebag over the abdomen, and lowering the head and preparing to operate, that often within half an hour or an hour, improvement in the patient's condition took place. The pulse came up, began to get stronger, and with the appearance of a stronger pulse, on digital examination they felt the formation of a tumor through the vagina. In cases where that tumor did not appear, the vaginal vault became more or less flattened. There was no resistance. They felt nothing, apparently. In these cases hæmorrhage went on, and they were not the ones that must be operated on at once, for if operation was done they would die. But in the other instances where a tumor formed they could afford to wait longer and encapsulation would take place and the patient could be operated on with absolute safety within a few days or even weeks.

Dr. Lewis S. McMurtry, of Louisville, stated the diagnosis was easy in these cases. He had known women who had had one attack of tubal pregnancy and were operated on, to make the diagnosis themselves in the second instance and call the doctor and tell him the condition that existed. He had one instance of that kind in mind then and there was no trouble with the diagnosis and the treatment. When a woman was bleeding to death inside, there was only one indication, and that was to operate as soon as possible.

Dr. Charles L. Bonifield, of Cincinnati, wanted to emphasize the point that in these cases by the time the operator got to the patient usually the hæmorrhage had taken place, and the surgeon did not operate to stop hæmorrhage, but to relieve shock, because in the majority of cases the hæmorrhage had already stopped. The patients who bled profusely did so quickly until blood pressure was relieved, and then the bleeding was slow until it stopped entirely.

Dr. Walter B. Chase, of Brooklyn, stated every member of this association believed he was grounded in the principles of surgery, but they had different methods of reaching the same end. They could not make a universal rule which would apply to every case of tubal pregnancy. The man who attempted to do it would go wrong more than half of the time. Every case must be treated according to the findings, and according to whether the physician was prepared to treat it at the time.

Dr. Joseph Price, Philadelphia, felt that cases of ruptured ectopic pregnancy and all perforative forms of disease belonged to the calamities, and they should be prepared to operate promptly. The

surgeon should be the cleanest and most prepared man living.

Dr. Congdon, in closing the discussion on his part, stated it was not always his policy to cross swords with his friends, but when they made the assertion that the diagnosis of ectopic pregnancy was always easy and that any one can make it without any preparation, he certainly must take exception to that statement. The members of this association meant that they could make a diagnosis, but not the average general practitioner.

Dr. Waldo, in closing, stated a mistake that was made much more frequently than any other was that the patient was suffering from incomplete abortion.

TUMORS OF THE BLADDER

Dr. John F. Erdmann and Dr. Joseph F. McCarthy, of New York, read a joint paper on this subject. The authors reported ten cases in detail and drew the following conclusions: that tumors of the bladder were translatable by the symptomatic hematuria, etc., which did not always permit clinically of a striking difference between them inasmuch as a small papilloma might give rise to a fatal hematuria, as well as a malignant one. However, one might arrive in certain cases at a precise diagnosis based upon the clinical evolution, the physical signs, and the examination of the fragments expelled. That the benign tumors might recur under two forms, first under the malignant form, a long period of time intervening before the recurrence; and it was a question whether the tumor beginning as a benign one had not become transformed into a malignant one. The actual state of knowledge of the subject did not at this time permit of this conclusion. A recurrence might take place after a long period of time as a benign one, as in two cases recorded by Dr. Erdmann with histological findings. Guyon stated that "the cases which I believe have permitted of this hypothesis of a transformation are very exceptional. I have already had an occasion to cite in studying the progress of neoplastic affections of the bladder many examples of vesical tumors of long duration even up to twenty-seven years, which did not undergo malignant transforma ion. Consequently one should be very reserved in discussing the question of transformation of vesical growths."

As to the mortality the authors quoted Dr. Francis S. Watson as follows: "The sum and substance of the result of operative treatment up to the present time may be stated thus: If the operative deaths and rapid recurrences are combined under the head of operative failures, such failures are seen to have occurred in 28.6% of cases in benign tumors, exclusive of myoma, and in 46% of cases of carcinoma."

According to the same author, out of six hundred and fifty-three cases of all tumors operated upon 243 were benign and 410 malignant. That the benign tumors recurred rapidly in 20.5%, the carcinomatous in 26.8%, and the sarcomatous in two to eight months in all except two out of 52 cases.

DISCUSSION

Dr. James E. Sadlier, of Poughkeepsie, New York, wished to report the case of a woman, sixty years of age. Cystoscopic examination of the bladder showed a tumor on the right side, somewhat posterior, but well above the right ureteral orifice, the tumor at its base being about the size of a silver dollar. It was protruding into the bladder and the surface had a sloughing appearance. The base was thick and indurated, and with a forceps through a Kelly cystoscope he was enabled to remove a fragment or two which the pathologist pronounced to be epithelioma undergoing carcinomatous change. In this case he tried the perineal operation as suggested by Dr. Charles Mayo and found it to be a comparatively easy operation.

Dr. Joseph F. McCarthy, of New York, stated those who had had anything to do with these growths knew they recurred with great frequency, and if there was any method of treating the smaller ones that did not involve a radical operative procedure, they should welcome it. Within the last few months Dr. Keyes and Dr. Beer, of New York, had treated these growths by fulguration or high frequency. He treated one case in which there were four growths, by this method, with gratifying results.

Dr. John W. Poucher, of Poughkeepsie, New York, said he had no argument to offer in regard to operative procedure for the removal of papilloma of the bladder, but he wanted to suggest something he had tried very successfully in the treatment of urethral caruncle. He had treated urethral caruncle for the last five years with a strong solution of argyrol and had not failed in a single case.

Dr. John W. Keefe, of Providence, Rhode Island, wanted to say a word about the use of the cystoscope. He was not wedded to the use of the water cystoscope because he had failed to find tumors in the bladder on account of severe hæmorrhage that occurred at the time the water cystoscope was used. With the air cystoscope these growths could be readily seen.

With reference to the transperitoneal operation it should be performed more often than the operation just above the pubes in the prevesical space,

especially if the patient was fat, as they had a deep wound in which to operate. By placing the patient in the Trendelenburg position they could readily have access to the bladder.

DR. LOUIS FRANK, of Louisville, stated that tuberculosis of the bladder was exceedingly rare as a primary lesion. It was always secondary to tuberculosis in other portions of the genito-urinary tract. So true was this that they could practically always exclude it as a cause of bladder disease. His experience with tumors of the bladder was confined to one or two cases. In these he was able to bring the growth up by the vulsellum forceps so as to remove it extravesically. The growth was excised, the base cauterized, and the bladder wall brought back and immediate closure effected, and catheter kept in. One case, which was operated on three years ago, had not had a recurrence. In the other case the tumor of the bladder was complicated or associated with hypernephroma.

ADENOCARCINOMA OF THE KIDNEY

DR. J. GARLAND SHERRILL, of Louisville, reported a case of a somewhat rare tumor of that organ, with histological findings. He mentioned briefly the various forms of renal tumor, especially hypernephromata. In the earlier writings much confusion existed with reference to nomenclature and the descriptions of renal tumors, but recent writings had brought a clearer understanding. Traumatism was mentioned as a factor in the etiology. Although a history of trauma in a considerable percentage of cases was given, there was no conclusive evidence that it was important in causing the growth. As important symptoms he mentioned hematuria, failing health, pain in the back and loins. The diagnosis of renal tumor was not always easy and differentiation before operation as to the character of the growth was usually not possible. While the mortality following nephrectomy for malignant disease was higher than for some other lesions demanding such treatment, it should be very low when done early with their present technique. From one-half to one per cent of carcinomata primarily affected the kidney. According to Kelynack, two to three per cent was a fair proportion of malignant growths of the kidney to malignant disease of other parts. A number of cases were collected from the literature by the writer, two of which were congenital, and in one case a number of calculi were present. Males seemed to suffer almost twice as often as females. Heredity seemed to play no important part in the development of these growths. They had no positive knowledge of the causative factors in the production of these tumors, but it was probable that a large proportion were of congenital origin, due to cell rests. A number of cases of injury of the kidney subsequently followed by carcinoma had been reported. Although the position of the kidney rendered it especially free from traumatism, in a number of cases traumatism was reported as having caused the first hæmorrhage which called attention to the affection. Calculus had been claimed by some to be an important causative factor in the production of renal carcinoma, but the question yet remained *sub judice*.

The author then discussed the diagnosis, the symptoms and prognosis of these tumors.

The present mortality of nephrectomy for malignant disease was from 18 to 20 per cent, which should be reduced, in his opinion, by early diagnosis and prompt intervention. The only hope of recovery offered the patient suffering from malignant disease of the kidney lay in early and complete nephrectomy. Partial nephrectomy had been practiced at least five times for malignant tumor, according to Morris, but in every case the surgeon thought he was dealing with benign tumors and the results were not encouraging. In advanced cases palliation was always to be offered to the patient.

The author reported a case in which through an oblique left lumbar incision nephrectomy was performed, resulting in recovery. Upon incision through the kidney and growth after its removal the organ was found to be six inches in length by two and a half by two inches. At the lower pole an irregularly rounded nodular mass was observed. A number of branching vessels were seen on the surface of the tumor. On palpation it was not so resistant as the other portion of the kidney, and a few whitish spots were seen. On section the kidney appeared slightly congested with a tumor three inches in diameter at the lower pole, apparently encapsulated with infiltration into the parenchyma and also into the fat about the pelvis. Inside the capsule was a grayish-white mass of material a little firmer than thick cheese. The remaining portion of the kidney showed some congestion, but the tissue appeared to be almost normal except where the growth was infiltrated through what might be termed the capsule.

DISCUSSION

DR. JOHN F. ERDMANN, of New York, had operated on five cases of tumor of the kidney, four being hypernephromata, and one a large sarcoma.

DR. LEWIS S. MCMURTRY, of Louisville, stated with reference to the pathology it was very doubtful if the analogy between the relation of stones in the gall-bladder, stones in the kidney,

and the development of malignant disease could be established here. There seemed to be in the kidney with the presence and irritation of stone, on account of the different character of the tissue, and the different function of the tissue, a greater disposition to suppuration than to malignant disease, whereas in the gall-bladder they could not regard it as thoroughly established that the irritation of gall-stones was a distinct factor in the development of malignant changes.

THE BREAST OF THE EXPECTANT MOTHER; ITS CARE BEFORE AND DURING THE PERIOD OF LACTATION

DR. FRANCIS REDER, of St. Louis, Missouri, stated that to properly prepare a nipple the expectant mother was instructed to use soap and water freely. After drying the breast, gentle friction with a rough towel or flesh brush was made for about five minutes. Following this rubbing the nipple was massaged by rolling and kneading it between the fingers, gentle traction being made during these manipulations. The free use of olive oil during the process of massage, which was to be done twice daily, was advised. It was surprising how an almost hopeless appearing nipple would in a comparatively short time assume the characteristics of a normal one. The application of alcohol and astringent lotions was to be condemned. A nipple cared for with these agents would become hard and inelastic, presenting deep corrugations, which would impede the healing of any excoriation or fissure, should such a lesion occur. The pain accompanying such a lesion brought many hours of suffering to the mother. A nipple prepared by the method of a systematic massage would usually withstand the strain of the nursing period without mishap. Its care after the child had commenced to suckle resolved itself into one of simple cleanliness. Thorough ablutions after each nursing to free it from any accumulated secretions, and the liberal dusting with boric acid, which was washed off when the child was put to the breast, was all that was necessary. This regime must be diligently adhered to. The care of the breast was as important as that of the nipple. Its anatomical structure gave evidence of how readily this organ was amenable to culture, if only instituted properly and at the right time. The breast of a healthy girl that did not show development conforming to the incentive given by puberty should after an elapse of three years be subjected to the stimulating influences of a systematic massage. This massage was to be continued until a normal equipoise had been attained. By developing the breast at this stage of womanhood many of the obstacles pertaining to a normal motherhood might be overcome. The massage in reality was an exercise most simple in character. By placing a breast in the palm of each hand and locking the fingers across the chest, the young woman was asked to walk about in a well aired room, and with a full inspiration force the hands apart. This exercise was to be repeated for at least fifteen minutes daily. It was most conveniently carried out upon rising and before retiring, and should be continued until satisfactory results showed themselves. The normal breast of the expectant mother should receive some attention as soon as the physiological changes manifest themselves. The breast during the pregnant state did not require the judicious management that the breast demanded after lactation had established itself; it was of the greatest import, especially if the breast gave evidence of great fullness and tension with tenderness, that the lactiferous ducts be maintained in as patulous and healthful a state as was possible. In short, the secretions in the tubes should not be allowed to become stagnant. It had been demonstrated that the staphylococcus albus and also the staphylococcus aureus found entrance into the milk ducts from the skin. That this so-called milk fever was the result of these micro-organisms having gained entrance into the lactiferous ducts, and having been stimulated into great activity by finding a proper medium in the milk for their propagation, had been to him the only explanation.

DISCUSSION

DR. THERESA BANNAN, of Syracuse, New York, had been looking for milk fever which was referred to by the essayist for twenty years in practice and had not found it. The question of the care of the nipple of the expectant mother was of far-reaching and tremendous importance. It solved fifty per cent of the problems of pure milk. It meant not only the health of the mother but the life not only of the first child, when most of the difficulties arose, but all of her subsequent children.

DR. WILLIAM G. DICE, of Toledo, Ohio, stated it was the general practitioner who was at fault to a great extent. He thought most patients were willing to take proper care of their breasts if given proper instruction. He did not recall seeing in his practice more than two cases of abscess of the breast in ten years.

DR. A. J. RONGY, of New York, thought the term milk fever had been eliminated from obstetrical work. In a record of six thousand cases in both hospital and maternity work they practically did not have what was known as mastitis. They never had cases of suppurative mastitis. It

seemed to him the trouble with these engorged breasts, or with so-called milk fever, was in doing too much for the patient rather than doing too little.

DR. J. H. CARSTENS, of Detroit, was opposed to the application of alcohol or tannic acid and other astringents to the breast. The nipple of the mother should be soft and pliable.

THE PRESIDENT'S ADDRESS: GYNECOLOGY

The President, DR. AARON B. MILLER, of Syracuse, New York, after speaking of the recent advances that had been made in obstetrics, gynecology and abdominal surgery, said the scope of work of the members had gradually increased since the knowledge of bacteriology had illumined the way to a more accurate diagnosis and given them a known pathology. He quoted the prophetic statement made by J. Marion Sims in 1882 to the effect that it would become possible to open the abdomen in gunshot and stab wounds, to repair and thereby lessen the mortality attending these injuries. In the master mind of Sims the seeds of advancement had taken lodgment. His observations and associations abroad had given him an oversight into the possibilities of the future, the possibility of surgery becoming a science, founded on findings that were indisputable. With the advent of bacteriology came a new school of surgeons whose knowledge was founded on facts, not theories, and like the mariner, who consulted his compass, had known laws to direct them. The field of gynecology, the pelvis, with the abdomen appended, was their hunting ground, and like an army marching to victory, the field was soon taken. Now all the organs of these cavities, abdomen and pelvis, had felt the results of advancement and had yielded of their pathology abundantly; and not pathology alone, as the organs of this casket had even been maimed and sacrificed in their healthy state for reasons that at times would have shocked Hippocrates, and should arouse them, as it was the purpose of this association, according to its constitution, to advance the knowledge of obstetrics, gynecology and abdominal surgery to its highest scientific attainment, to enlighten the general practitioner in all matters pertaining to these different departments, by eliminating the erroneous teachings, and accentuating the essential; to stamp with approval all real merit and extinguish sham. The knowledge of the real etiology of disease robbed surgery of its terrors and opened the pelvic and abdominal fields for investigation through a perfected technique, with but little fear of serious consequences attending thorough exploration, thereby revealing the living pathology and rendering the arrest or elimination of disease possible. In the obstetrical art marked results had been obtained through a knowledge of infection. From a heavy death rate following confinement, from these causes, the technique carried out in hospital practice had almost eliminated the mortality.

In the field of gynecology, the disease that stood as a lone sentinel against the advancement of science, yielding not its etiology, was cancer. Having existed since the early history of medicine, it had withstood all investigation. While all forms of maladies had crumbled in ruins about it, it had continued its ravages, until many thousands of people in the United States were dying annually of this disease.

Cancer of the breast, recognized and treated in its inception by early operation, had resulted in a greater percentage of cures and materially lessened the mortality. It was the consensus of opinion that cancer of the stomach had its origin on the site of an ulcer. Prophylactic treatment prevented the cancer by curing the ulcer. Prophylaxis must be introduced in the prevention of cancer of the uterus by early repair of lacerations. Traumatism was the accepted factor in inducing cancer of the breast, and following upon or secondary to lesions in the viscera, as stomach, gallbladder, pancreas, lip, etc., reasoning by analogy, that with its increased frequency at the neck of the uterus in parous cases, the presence of lacerations would be an exciting cause for its presence here, encouraged through the degenerations that took place, and, as a preventive measure, repair of the injuries would in many cases arrest it.

Reference was made to the havoc caused by gonorrhœa and syphilis. He said that gynecologists had been slow to impress upon the public and to enlighten women especially as to the great dangers that threatened them through ignorance of these diseases that were liable to be brought to them through unsuspected avenues. This subject had been so enshrouded in mystery that boys and girls had grown to mature manhood and womanhood, ignorant of the laws that should govern their lives, for fear that the knowledge of sexual diseases might lead to contamination. Gynecology in its inception should be begun as with the tender plant. Proper environment should be placed about the growing child to aid in development and to protect when dangers threatened, thereby promoting stronger, healthier bodies.

PUERPERAL WOUND INTOXICATION AND WOUND INFECTION; A HISTORICAL AND CRITICAL REVIEW OF CHILDBED FEVER

DR. HENRY SCHWARZ, of St. Louis, Missouri, stated that isolated cases of puerperal fever had

occurred at all times among civilized nations, but the dreadful epidemics of this disease appeared with the advent of the lying-in hospitals and they became more dreadful when frequent autopsies were made in the search of the cause of the disease. Oliver Wendell Holmes was the first to point out the contagiousness of puerperal fever and the means for preventing it. His epoch-making essay, "The Contagiousness of Puerperal Fever" appeared in 1843. Semmelweis in 1847 was second to insist on the same points and to demonstrate the correction of his views by reducing the mortality from childbed fever in his Vienna clinic. The appeals of Holmes and Semmelweis remained unheeded until the advent of Listerism and the establishment of bacteriology.

Hungary, the native country of Semmelweis, had honored his memory by having his ashes removed from Vienna and depositing them in an honor-grave at Budapest; a memorial tablet pointed out the house in which he was born; a grand Semmelweis monument had been erected on one of the finest squares in Budapest.

The medical profession of the United States had almost forgotten that Holmes had equal, if not greater, claim to be remembered as the discoverer of the nature of puerperal fever. Most text-books did not mention him, while they did justice to Semmelweis; the one pleasing exception was the text-book of Barton Cooke Hirst.

Bacteriological classification had caused many teachers to fail to present to their students a clear subdivision of clinical pictures, and while the writer insisted on the necessity of ascertaining the nature of the infecting germ by smears and cultures, he likewise insisted on the advantage of sharply separating wound intoxication or sapremia from wound infection, and of subdividing wound infection into the milder and more or less localized forms which usually got well, namely, puerperal ulcers, puerperal endometritis, puerperal parametritis, puerperal perimetritis, and puerperal phlebo-thrombosis, and into the general infections which were inclined to be fatal, namely, pyemia, general peritonitis, and general sepsis.

At present the medical profession was fully acquainted with the nature of puerperal infection and with the means which would absolutely prevent it. In well managed institutions infection had been driven out, but nevertheless thousands of young mothers died yearly in the United States whose lives could be saved. Who was to blame? The cause lay partly in the inadequate obstetrical training which the medical schools until recently provided; this cause was now rapidly disappearing.

The principal cause lay in the fact that throughout the United States a large part, in the large cities the greater part, of the obstetrical work was done by midwives, and that with few exceptions no laws existed regulating the practice of midwives. The writer pleaded for the enactment of such laws and for putting the schools for midwives under control of state boards.

The exceptions were Missouri, Louisiana, Ohio, Wyoming, Utah, and the Philippine Islands; their laws provided for examination and registration, but not for control of the schools. Maine and Mississippi especially declared that their medical practice acts did not apply to midwives; the law of Mississippi said: "Females engaged in the practice of midwifery were not prohibited from such practice, but were entitled to engage therein without a license."

SERUM THERAPY AND BACTERIAL VACCINES IN THE TREATMENT OF PUERPERAL SEPTICEMIA

DR. HENRY SCHWARZ, of St. Louis, Missouri, stated that since Marmoreck's antistreptococcic serum was placed upon the market in 1895 he had used the various antistreptococcic sera in those cases of severe acute puerperal sepsis, which according to his judgment, were hopeless under other forms of treatment. The first case in 1896 was one of severe pyemia and recovered; no bacteriological diagnosis had been made. In all other cases cultures made from the blood proved the presence of streptococci; every one of these cases died. Streptococci were found in the blood oftener than was formerly supposed, even in the more or less localized infections, but in these the serum was not employed.

When bacterial vaccines were recommended in the treatment of acute infections the writer considered such use not only hopeless and illogical, but he feared that it would injure the reputation of vaccines in their legitimate field. In acute streptococcic infections billions of streptococci were found in the blood; they died by millions and their bodies were dissolved, liberating thereby the endotoxin which during life was retained in the capsule, but which now swamped the system. The formation of antibodies under such conditions was very feeble or at a standstill, to inject millions more of dead germs, with their endotoxins, showed as much sense as the injection of morphin into a patient dying with morphin poisoning.

To prove his contentions the writer caused to be undertaken a series of experiments on rabbits which proved the following points: 1. Vaccination after inoculation had no influence on the infection; all animals died in three days, the same as the control animal. 2. Vaccination simultaneous with

inoculation had no influence on the infection; all animals died in three days, the same as the control animal. 3. Prophylactic vaccination produced immunity, but it must extend over a considerable period and vaccination must be stopped ten days before inoculation. Intraperitoneal and intravenous vaccination prolonged the duration of the infection so that animals so vaccinated died two days later than the control animal. Subcutaneous vaccination alone was effective and animals vaccinated every four days from July 24th to August 28th and inoculated September 7th, remained well while the control animal died in three days. Excessive vaccination (fifty to two hundred millions in average weight animals) produced no ill effect beyond a temporary refusal of food. The experiments were being continued.

ACUTE PANCREATITIS

DR. JOHN W. POUCHER, of Poughkeepsie, New York, reported two cases. In his first case the fever only began after the action of the ferment had destroyed the function of the intestine and probably other organs in the abdomen. In the other case prompt and efficient drainage prevented any serious action upon the tissue of the organs. In this case there never was more than a slight rise in temperature. His experience in these two cases seemed to point to two conclusions, namely, early and free incision down to the pancreas and adequate drainage.

ACUTE HÆMORRHAGIC PANCREATITIS

DR. JOHN W. KEEFE, Providence, Rhode Island, reported eight cases of this disease, and said that these cases were of interest from several standpoints. Two cases recovered of the eight cases reported. Two patients were operated on twice. One was operated upon for acute hæmorrhagic pancreatitis and one one-half year later was again operated upon and four gall-stones removed from the gall-bladder. Dr. Giles, of New Hampshire, reported a similar case. He operated for acute hæmorrhagic pancreatitis and his patient was operated upon about one year later by Dr. Irish and a number of gall-stones were removed. Another case in this series was operated upon for acute hæmorrhagic pancreatitis and some months later a pancreatic cyst was removed. The events were reversed in one of the cases. Thirty-two gall-stones were removed, but a stone was left in the common duct. The patient some months later died from acute hæmorrhagic pancreatitis. They should keep in mind the close relationship between infection of the bile passages and disease of the pancreas. While they should strive to make more accurate diagnoses in lesions of the abdomen, in obscure conditions they should not delay, but should operate early, as most of the conditions that simulated pancreatic disease required surgical interference.

PERFORATED GASTRIC ULCER

DR. THOMAS B. NOBLE, of Indianapolis, Indiana, reported two cases of peritonitis due to perforated peptic ulcers. These cases were the first and only of their kind he had seen. The pathology and symptomatology were very analogous to perforation of any hollow viscus of the abdomen. The diagnosis must depend upon the recognition of a demonstrable peritoneal insult as evidenced by sudden, severe pain about the umbilicus or epigastrium, with local tenderness, followed by vomiting and the general symptoms of shock. Careful inquiry revealed a period of gastric disorder antecedent to the acute attack. Symptoms of acute peritonitis, more or less general in character, rapidly ensued, and it might be that they would overshadow all others at the time of observation, as happened in his first case.

PUBLIC AND PRIVATE HOSPITALS

DR. JOSEPH PRICE, of Philadelphia, pointed out the importance of these hospitals in the education of young physicians and nurses, and the clinical instruction of practitioners.

TORSION OF THE GREAT OMENTUM

DR. WILLIAM J. GILLETTE, of Toledo, Ohio, said the diagnosis prior to operation was difficult and uncertain. He pointed out the diagnostic signs that were available; also spoke of the frequency of this condition, and its mortality, thirteen per cent, should warrant its more careful study. The case he reported was unusual and made it probable that death from gastric and colonic hæmorrhage as a consequence might ensue.

CÆSAREAN SECTION

DR. J. H. CARSTENS, of Detroit, Michigan, reported a case where the pregnant uterus was within an umbilical hernia. Mrs. M., aged forty, mother of three children, widow for ten years, married again one year ago, grew very fleshy. She became pregnant and towards the end it was found that the uterus was in the hernial sac and the abdomen pendulous, hanging down to the knee. On vaginal examination the uterus could not be felt. It was pulled up. Cæsarean section was resorted to and followed by a smooth recovery.

HIGH OPERATION IN CÆSAREAN SECTION

DR. WILLIAM H. HUMISTON, of Cleveland, Ohio, emphasized the substitution of the Cæsarean

section for the high forceps operation which was attended with a mortality to the mother of ten per cent and to the child of nearly twenty-one per cent. The technique employed in the modern Cæsarean operation had been so perfected, and the indications for the operation so widened that it was now very frequently resorted to in order to give both mother and child greater chances for life. The rapidity with which this operation could be safely performed by an experienced abdominal surgeon was an important factor for the safety of the mother and the life of the child. Modern aseptic technique and favorable surroundings were essential and would insure practically a nil mortality, provided the mother had not already been infected by repeated examinations and efforts to deliver. In all cases in and near a city or town, where hospital accommodations were modern, the patient should be transported to such an institution for operation and convalescence.

Dr. Humiston detailed a case in which he resorted to the high operation with success.

CÆSAREAN SECTION BY THE SMALL MEDIAN INCISION ABOVE THE UMBILICUS

Dr. Asa B. Davis, of New York, stated that of the seventy-eight Cæsarean sections performed by him, the first three were done in tenements; the uterus was delivered. Since August 12, 1903, he had done the operation seventy-five times and in no instance had the uterus been removed from the abdomen. Beginning with case four a much smaller incision was used, half above and half below and to the left of the umbilicus. In the seven cases following this one he gradually made the incision smaller and carried it higher up, until November 20, 1904, he, so far as he knew, first independently conceived and practiced the small high median incision entirely above the umbilicus, in a woman, the twelfth of his series, it being the second Cæsarean section done on this woman, the same as case four. More than two years after this date an allusion to the high incision was brought to his attention in Blundell's Midwifery, published in 1842. There was no reason why this operation should be singled out from all others as one which must be performed in great haste. It should be done with the deliberation called for in any other abdominal operation. There was great danger in doing otherwise. Several times the writer had found the intestine in front of the uterus. Once he had seen it injured. The incision should be long enough to allow easy delivery of the child, but the abdominal wall at this point in the full term woman was thin and stretched easily. The small high incision did not allow easy exposure or escape of the abdominal contents. Not infrequently all that we saw was the uterus and a small portion of omentum. This wound was away from the site of greatest strain upon the abdominal wall, at a point reinforced by the recti muscles as they approached each other towards their upper attachments. It was small. He had never seen hernia following it.

SECONDARY REPAIR OF COMPLETE PERINEAL LACERATIONS; ITS TECHNIQUE AND RESULTS

Dr. Edward J. Ill, of Newark, New Jersey, said there were still many failures resulting from the operation for complete laceration of the perineum. His first operation after the method to be detailed was done February 1, 1891. A doubtful case of improvement had the power of perfect retention within a few months. Altogether fifty-six cases were reported, all of which showed remarkable and uniform success. Twenty-six cases were complicated by other operations. In his operations he followed the principle laid down by Saenger, as the Tait operation in 1887. The operation was essentially a flap-splitting operation and could be divided into six distinct steps: 1. The incision. 2. The flap splitting. 3. The suture of the rectum. 4. The suture of the perineum. 5. The suture of the vagina. 6. Twisting of perineal sutures.

The operation he described was a modification of the Saenger-Tait operation. Incisions were of H-shape, beginning at a point just outside of the orifice of Bartholin's glands, extending downward and backward just outside of the retracted sphincter. The crossbar of the H was carried exactly across at the mucous membrane of the rectum and vagina. Two flaps were formed, an anterior and posterior. The posterior one denuded the ends of the torn sphincter. The suture of the rectum was done with the finest catgut in the denuded tissue of the posterior flap. He preferred silver wire for the perineum. Three sutures took care of the sphincter. The fifth step consisted of suturing the anterior flap of the vagina. He urged great exactness in the coaptation of the wound when twisting down the sutures of silver wire. These sutures were cut on the ninth day. The after-treatment consisted of moving the bowels in forty-eight hours, preceding the act of defecation by a sweet oil injection. It was best to have the first movement with the patient on her left side, the nurse supporting the newly-made perineum. Urination was usually normal, and the patient was allowed to sit in the commode rather than to catheterize her. The patient should

be well aware of her retention powers at the time the sutures were removed.

INTUSSUSCEPTION IN INFANTS

DR. HERMAN E. HAYD, of Buffalo, New York, said that the treatment of this condition was surgical, and the mortality increased tremendously the longer the operation was delayed. Injections, irrigations, and insufflations were too uncertain to be practical and scientific, but in recent cases they were often of value in assisting subsequent reduction after the abdomen was opened. The operation should be done quickly, and no time should be lost in fruitless manipulations of the bowel. It was better generally to eviscerate at once and reduce the mass outside than try to effect its reduction within the belly cavity.

Dr. Hayd detailed a successful case on which he had operated.

CONSERVATISM IN OPERATIONS ON THE UTERINE APPENDAGES

DR. LEWIS C. MORRIS, of Birmingham, Alabama, drew the following conclusions: 1. No woman under forty years of age should have all of both ovaries removed, except in the presence of tuberculosis or cancer. 2. Resection or amputation of diseased parts and plastic work on the tubes would occasionally be followed by conception. 3. Even in the presence of infection and more or less involvement of both tubes and ovaries plastic work, followed by pelvic drainage and the Fowler position, might be followed by regeneration. 4. Radical or sacrificial surgery and conservative surgery had about the same mortality, but a vastly different morbidity. 5. A very occasional secondary operation might become necessary which might have been avoided by doing radical work.

INTRAVENOUS INJECTION OF MAGNESIA SULPHATE IN BACTEREMIA

DR. RALEIGH R. HUGGINS, of Pittsburg, stated that in the study of drugs causing hyperleucocytosis, it was determined to find out, if possible, whether magnesia sulphate might act in this manner when administered intravenously. After a careful study in both rabbits and the human, it was decided that it did not produce a regular increase in the leucocytes when thus administered. During this study a number of intravenous injections of magnesia sulphate were administered to human beings. It was determined that magnesia sulphate could be given intravenously without any apparent harm to the patient. Experiments showed that a one per cent solution of magnesia sulphate in a normal saline would not produce hemolysis of the human blood. It would not precipitate the globulins, as claimed by Teubusher, when given in this dilution, nor had the writer seen any effect upon the specific gravity of the urine. It was decided that thirty grains of magnesia sulphate in eight ounces of normal saline could be safely administered intravenously to the average individual. It must be given slowly into the vein at a temperature of 105 to 108 degrees. The time occupied in allowing this quantity to run into the vein was twenty minutes. If allowed to flow into the vein rapidly, respiration became embarrassed, and the patient complained of heat all over the body. It had been given in this manner fifty times either by the writer or his assistants, and the results in many instances had been extremely gratifying. It had been given at intervals of twenty-four hours for several days.

It was during this study that it was determined to try its use in a patient suffering from puerperal infection. A number of cases, which were beginning a typical course, similar to others who died in spite of all treatment, had been treated by intravenous injections of magnesia sulphate with apparent benefit. Its use had been limited almost entirely to the treatment of puerperal infection, and the number of cases treated were too few to draw any conclusions.

FIBROMYOMATA OF THE UTERUS COMPLICATING PREGNANCY, LABOR, AND THE PUERPERIUM

DR. RALPH WALDO LOBENSTINE, of New York, read a paper which was based upon a study of one hundred cases occurring at the New York Lying-In Hospital. The chief deductions from this series of cases were: 1. A myomatous condition of the uterus predisposed to sterility. Parvin stated that while the average sterility was one in eight, it was one in three in women with myomata. Charpentier's figures corresponded closely to these. 2. The tendency to abortion was increased. In the bad cases, both spontaneous and artificial abortion might prove difficult to handle by the natural channel, and was most dangerous to the life of the individual. In the severe cases, where it was difficult to gain access to the cavity of the uterus proper, and in the presence of real hæmorrhage, laparotomy was the operation of choice. 3. The great majority of the cases that did not abort early proceeded through pregnancy, labor, and the puerperium with few or no symptoms; therefore, operative interference was but rarely indicated during pregnancy and was, as a rule, meddlesome midwifery. He made this statement cautiously for he knew well that in the minds of many it would be open to criticism. The opera-

tion of myomectomy during pregnancy was just now very popular, but he for one believed it was rarely indicated. The results of myomectomy were none too good. Occasionally it might be wise to do a myomectomy, and occasionally necessary to do a hysterectomy, but as a rule conservatism should be the watchword. 4. Nature accomplished wonders at the time of labor, overcoming any apparent dystocia, in a large percentage of cases. During delivery, avoid all possible trauma to the tumor. 5. With the development of the symptoms of gangrene in a myoma in the puerperium, operate early to save the life of the patient.

TWO RIGHT-SIDED FEMORAL HERNIAS IN THE SAME PATIENT

DR. N. STONE SCOTT, of Cleveland, reported an interesting case, and the points of special interest, as illustrated by him, were the rarity of external femoral hernia; the importance of making a correct and accurate diagnosis; the possibility of the coexistence of an external and internal femoral hernia on the same side of the patient; the ease of overlooking the external when it was associated with the internal or more common form; the operative technique of the external femoral hernia was not essentially different from that of internal femoral hernia. Lastly, where both varieties were operated on the same side great care was necessary to prevent interference with the functions of the blood-vessels.

PUERPERAL ECLAMPSIA

DR. E. GUSTAV ZINKE, of Cincinnati, Ohio, read a paper on this subject in which he drew the following conclusions: 1. All cases of puerperal eclampsia were not alike; much depended upon the extent the kidneys and liver were involved. The so-called malignant form, as the term implied, was fatal from the beginning. The so-called benign variety ended in recovery sometimes in spite of the treatment adopted. The variety of mean gravity was without doubt favorably influenced in its course by careful and judicious treatment. 2. The prognosis for both mother and child was much worse when the convulsions supervened during pregnancy, the maternal mortality ranging between thirty-five to fifty per cent; the fœtal mortality between sixty-five and seventy-five per cent. The prognosis of intrapartum convulsions was more favorable, maternal as well as fœtal, and amounted to about twenty-five per cent. The maternal mortality of postpartum convulsions was, as a rule, about seven per cent. In his own experience, having had but two cases, it was fifty per cent. 3. The most important treatment of puerperal convulsions was prophylaxis before the appearance of symptoms as well as before the eclamptic attacks when prodromal signs existed. The patient must be protected from injury during the convulsions and the duration and frequency of the paroxysms should be controlled and abbreviated medicinally rather than surgically. Veratrum viride in sufficiently large doses was the remedy par excellence to reduce the blood pressure and the pulse frequency. Hot baths and hot packs, judiciously employed, and free but not excessive catharsis, strict milk diet, and the recumbent position were of almost equal importance. 4. Chloral in large doses per rectum, if the patient was very restless during the interval of the attacks, was a splendid remedy. Chloroform inhalations, especially if of long duration, should be regarded as a source of great danger. The same might be said of frequent and large doses of morphia, both of these drugs having their ardent advocates. 5. The antitoxin treatment (the thyroid, parathyroid extract and nephrine) might play an important part in the future in the treatment of eclampsia. 6. Saline and sugar water instillations could do no harm and might do a great deal of good. 7. If, of late years, the maternal mortality of puerperal eclampsia had been reduced at all, it was the direct result of careful prophylaxis and intelligent medical care. Surgery had contributed nothing to it. The dictum "assist in labor, but do not induce it," or "treat the convulsion and let the pregnancy take care of itself," was better than the dictum, "empty the uterus as soon as possible in every case of puerperal convulsions, no matter what the period of gestation." 8. Decapsulation of the kidneys, manual, balloon, and metal dilatation, especially the old time accouchement forcé were in the opinion of the author hardly justifiable and should have no place in the treatment of puerperal eclampsia. 9. If, however, the symptoms were very threatening and the medical care above described failed to bring about promptly an amelioration in the patient's condition, an early delivery might be desirable. If the patient be near term, but not in labor, the conservative Cæsarean section should be selected. If the patient was just within the period of viability, vaginal hysterotomy was the proper procedure. If the fœtus was not viable before the end of the sixth month of gestation, deep cervical incisions would easily relieve the uterus quickly of its contents. 10 No one had a right to perform any of these three operations unless experienced and familiar with the technique of each, and in every instance the patient should have the benefit of

strict asepsis. Without these requirements it was best to rely entirely upon the medical care above outlined.

PELVIC REFLEXES

DR. ROBERT T. MORRIS, of New York, spoke of afferent and efferent reflexes, and said in a certain proportion of patients with pelvic reflexes there was the neurotic habit. These patients were neurasthenics. If a surgeon took out one ovary for pelvic pain, the patient was just as badly off as before the operation. If the other ovary was removed, she was just as badly off as before. The surgeon must deal with neurotic patients with a great deal of intelligence. They represented a class calling for surgery, but the surgeon should beware of patients with pelvic pains, ovarian and tubal troubles, and neuralgic pains, particularly those of the neurotic or neurasthenic type. We had a group of disturbances proceeding from a scar of the cervix. How were we going to determine whether we were to operate in a case of reflex trouble with a torn cervix? Very many patients had torn cervices. Did the cervix require operation for its repair? Did we do the right thing if we operated because we found tears and scars? No. We were not to operate in such cases unless there were definite reasons for so doing. If one should press on a scar of the cervix with his finger nail, or with the sharp point of a retractor, and bring out instantly that reflex, then the case was one requiring operation for reflex disturbance; but if one should press on a scar and the patient did not know it, or if one should press on another scar and the patient did not know it, we should not operate on that case, no matter how much the cervix was torn, for the relief of reflex disturbance. One might operate for a repair of a torn cervix on general mechanical principles, but not for the object of relieving the efferent reflex.

OFFICERS

The following officers were elected for the ensuing year: President, Dr. Herman E. Hayd, Buffalo, New York; First Vice-President, Dr. Henry Schwarz, St. Louis, Missouri; Second Vice-President, Dr. Lewis C. Morris, Birmingham, Alabama; Secretary, Dr. William Warren Potter, Buffalo, New York (re-elected); Treasurer, Dr. X. O. Werder, Pittsburg, Pa. (re-elected).

Louisville, Kentucky, was selected as the place for holding the next annual meeting; time, fourth Tuesday in September, 1911.

CHICAGO MEDICAL SOCIETY

REGULAR MEETING HELD OCTOBER 5, 1910

DISCUSSION ON THE PAPER OF MR. LANE

DR. A. J. OCHSNER: Mr. President and members: Several years ago, when Mr. Lane first discussed this subject, it seemed almost beyond discussion. Then, when he came to this country and presented the subject in the forcible and impressive way that he has presented it to-night, and later on, when I had an opportunity of discussing it with him personally, it seemed to me as though he had brought to us a thought which was well worth considering. Following this visit, he made a second visit, and I was personally more forcibly impressed with the fact that the subject was well worthy of our attention. In every case in which these various symptoms were present, to which Mr. Lane has alluded, and in which I had an opportunity to open the abdomen for other cause or causes, probably in many of the cases I should have opened the abdomen for this specific cause, for the reason it is quite possible that many of the patients who were operated upon for the relief of gall-stones, and for the relief of pyloric obstruction, should have been operated upon for the relief of the condition he has mentioned, and if this had been done the ultimate results might have been better. At the present time, I recall a number of cases on which I operated for the relief of cholecystitis, those in which the gall-bladder was full of black, sandy, infected bile, and it seems to me as though in many of these cases the operation probably did not do as much good as a short circuiting of the bowel would have done, because in a recent investigation of all my gall-bladder operations I find that it is just this particular class of cases of gall-bladder surgery that were not definitely and permanently benefited. In a large number of cases I have found the anatomical conditions which Mr. Lane has described. In only five cases since his second visit to this country have I performed the operation. I will speak of the results of these operations later when I have operated on a sufficient number of them to be entitled to an opinion. But

I will say this, that many of my friends who have seen Mr. Lane's cases have convinced me that whenever we shall have arrived at a point by which we will be able to recognize the cases suitable for this operation, then we will begin to benefit a very large number of patients by performing it. Later on, we will do as we have done in appendicitis and with salpingitis, and all such pathological conditions, we will perform this operation for strabismus and for other conditions that have absolutely nothing to do with it. But that should not be placed to the discredit of a condition which actually exists, and which can be relieved. The mechanical relief afforded to patients by this operation is new. Our ideas of constipation have been as broad and as manifold as can be imagined, but the specific placing of this condition anatomically, as Mr. Lane has placed it, is undoubtedly new, and the definite method of relief is new, and I am sure the time will come when we will have the courage as surgeons to relieve those patients whom we know are suffering from this specific condition, and to relieve them in a manner in which he has described to us. At the present time, I confess that every now and then, if I had more courage, I would perform the operation oftener. I have performed it oftener this year than in the previous two years, but I am sure not as often as it should be performed.

I think we are to be congratulated on having had Mr. Lane here to read this very valuable paper.

DR. FRANKLIN H. MARTIN: I would like to ask Mr. Lane, in closing the discussion, to state in a few words the operation he had referred to, that is, indicate this short circuiting operation of the bowel. A great many of us probably understand it clearly, but others do not understand it, and possibly it would be well if he were to make a drawing on the blackboard or indicate by words this operation which would enlighten us on that point.

DR. ARTHUR DEAN BEVAN: I am sure that you have all been delighted, as I have been, with the interesting and original ideas presented by Mr. Lane. I have fortunately had the opportunity of seeing Mr. Lane operate and remove the colon on two different occasions, and I must say that if I were to have my colon removed, I should select Mr. Lane to remove it, but I am going to hold on to my colon for a time yet. I am one of those who is not fully convinced by Mr. Lane's arguments. I think his ideas are very original. They have been very well thought out, and he has a definite basis for the operation; at the same time, it does not appeal to me. Personally I should as yet limit such an operation as the short circuiting and removal of the colon to conditions where there was absolute obstruction, and where we clinically or anatomically at the time of the exploratory operation can demonstrate absolute obstruction. I want to say, however, that I am very much interested in the subject. Mr. Lane will carry on his work, and truth will always prevail, and if he is right time will demonstrate that his work and the work of his followers are facts.

DR. W. R. CUBBINS: I feel highly honored in being asked to discuss the paper of Mr. Lane, a man who is so eminent in surgical work. When we know that Metchnikoff has sent his assistants to study and observe the work carried on by Mr. Lane, it is worthy of our serious consideration. But I do not believe that his work has been appreciated that he believes intestinal intoxication to be a causative factor in the production of different abdominal diseases. So far as I can learn from Mr. Lane, he believes it is a direct causative factor of gastric ulcer, of duodenal ulcer, and of gallstones in a large percentage of cases. That this is not without foundation has been proved by bacteriological researches, as witnessed by the work of Dr. Turck of this city, which is undoubtedly epoch making, whether we wish to recognize it in Chicago or not.

The next point is the work of Metchnikoff has proceeded along a different line, taking the gas-producing bacillus and the anerobe, he has failed to produce ulcer in this manner, while this bacterium, as used by Dr. Turck, has produced it.

Mr. Lane in speaking of the changes that result in female breasts, shows that the lobulations that occur in the upper and outer quadrant, particularly of the left breast, secondarily in the right breast, are distinctly pre-cancerous. It seems almost as if we were treading on dangerous ground and yet at the same time it is something of which he is convinced. That brings us to the proposition of cancer as an infection being carried in a hematogenous manner. The next thing which he brought out in his paper is that we find intestinal intoxication not only in people who are constipated, but it may be found in people who have a daily evacuation. That brings more strongly to my mind the researches of Dr. Turck and of Metchnikoff to the effect that the specific bacillus may be an inhabitant of the colon, and that its toxic products are directly responsible for the production of an ulcer and of changes which occur in the gall-bladder, and which to-day are not satisfactorily explained by any mode which we can assume.

DR. FENTON B. TURCK: I think we are to be more than congratulated on this intellectual baptism to-night, for the reason that we have had

geniuses from abroad brought here to inspire us and to instruct us, to arouse the lethargy of those who only practice medicine and never dream that in that practice there is science in every movement which they make. We have heard the bacteriological studies first presented by this eminent experimental observer, Mr. Lane, of England, Guys Hospital, and if you were to see his work there and the magnificent enthusiasm with which he goes into it, I am sure it would call for your admiration. We should remember that geniuses of this type must be enthusiastic or we will not progress. The bacteriological work he mentioned was instigated by Pasteur's work.

We have also had to-night a remarkable contribution from Dr. Wickham, of Paris, on radium therapy. Radium has revolutionized the world in physics and our ideas in the cosmos of matter, and here comes a savant, a genius, who presents results that are marvelous in the cases he has treated with radium. These contributions and results should be inspiring to every one of us. And I want to say in reference to Mr. Lane's interesting work from a scientific point of view that we owe a great deal to surgery. It is through surgery that we learned the bacteriology of appendicitis, relating to the colon bacillus. It was through surgery that we learned the bacteriology of cholangitis, and it was through surgery that every advancement has been made in internal medicine, and I am sure we owe a debt of gratitude to Mr. Lane for what he has done in this particular field of activity, and for what we understand about the gastro-intestinal flora and its effect upon the micro-organisms. I simply wish to express a feeling of gratitude to Mr. Lane for what he has done, and also to present this one thought, that we must accept these things and act upon them and utilize them in our daily work. We are not mere artisans, but we are scientific men, and we need only to be aroused to see what can be accomplished, and each one should do his share in research work. The clinician and laboratory worker must combine their energies. They must work together. There is no such thing as divorcing laboratory work from clinical work. It is all scientific now. There was a time when the laboratory was separated from clinical work, but that day has passed. The clinician is a scientific man and should use every opportunity of acquiring knowledge in which the laboratory worker plays a prominent rôle.

MR. LANE, closing the discussion: If I have one cause for congratulating myself more than another it is on the interest that Dr. Ochsner has taken in regard to the subject of intestinal stasis. It would be an insult on my part to praise him before the audience that is present, so I will not pretend to do so, but will leave the subject in his hands with the utmost confidence.

Dr. Martin asked about the method of operating. The method of operating is simple. If there is a large quantity of intoxication and little pain, I cut the ileum and establish a communication between it and the rectum. If there is much pain, I may be obliged to connect the ileum with the sigmoid, and in these cases I remove the big bowel.

[With reference to the remarks of Dr. Bevan, I will say that there is no likelihood of one having the opportunity of removing his large bowel, because I think it is too happily placed. (Laughter.)]

CORRESPONDENCE

Editor of SURGERY, GYNECOLOGY AND OBSTETRICS:

My dear Doctor:—It is a known fact that the victims of uterine cancer are frequently women of exceptional avoirdupois, but as far as I am able to judge, the scientific physician has not as yet taken into consideration the possibility that the feature of weight may be a help in connection with an early diagnosis of the disease. After personally studying 24 cases, with this possibility in view I am steadily becoming convinced that the incipient stage of cancer of the uterus is coincident with the *maximum* weight of the woman, irrespective of age; and that this incipient stage may vary, as does that of the recognized stage of the disease. Of the cases interviewed by me, I will quote first only those from whom I received definite answers to three questions recently formulated (and since slightly altered) to obtain data from which to prove or disprove my suspicions. All but one were cancer of cervix, and all but one diagnosed as inoperable.

Case 1. Age 52; maximum weight attained about 5 years ago; duration of good health and strength, about 4 years; symptoms appeared 7 months ago.

Case 2. Age 58; maximum weight attained about 3 years ago; duration of good health and strength, about 1 or 2 years; symptoms appeared 5 months ago.

Case 3. Age 38; maximum weight attained about 7 years ago; duration of good health and strength, about 5 years; symptoms appeared 2 years 8 months ago.

Case 4. Age 54; maximum weight attained about 4 years ago; duration of good health and strength, about 3 years; symptoms appeared 10 months ago.

Case 5. Age 66; maximum weight attained about 10 years ago; duration of good health and strength, about 6 years; symptoms appeared 5 months ago.

The following gave decided history of a recent maximum weight, but the time of its attainment is not definitely stated, or answers to all three questions have not been noted.

1. Age 46. Gained the most the last couple of years.
2. Age 50. Two years ago weighed 214. Weighed as much, she thought, some time before.
3. Age 37. Fall previous to first hæmorrhage, weight was about 145. Never weighed as much before.
4. Age 58. This fall, weighed 145. Did not remember weighing more. Used to generally weigh about 126.
5. Age 48. She weighed the most she ever weighed, or 129 pounds, just before she started to be sick.
6. Age 36. Weighs the least now. Two years ago weighed 169. When 18 weighed 136. Began to get gradually thinner 8 months ago after baby was born.
7. Age 37. Was stoutest about 3 or 4 months before the blood came. (An Italian whom I could scarcely understand.)
8. Age 71. Weighed more than she ever did about 5 years ago.
9. Age 53. Was stoutest the last few years before she was taken sick. (Menopause 13 years ago.)
10. Age 52. Guesses she was stoutest about 3 years ago.
11. Age 58 (about). Attained greatest weight about 5 years ago.

Of the other women questioned, some could "not remember" or had "never been weighed." But one gave a history of maximum weight many years ago; possibly her life history would explain it.

To convince myself that I did not ask leading questions, I solicited data from eminent surgeons. I quote *every* case received to date. Most of these records were obtained from women in the hospital at the time being. Notes in regard to the question of *comparative* weight have not been found in literature, nor in the records, past or present, of any of the many surgeons to whom I have yet written or spoken on the subject, with the exception of one, who however, had failed to note the *time of attainment* of, or the *duration* of, this maximum weight. Following is the contribution of data he kindly sent:

"Case A. Age 48; maximum weight, 2 years before symptoms appeared.

Case B. Age 45; maximum weight, 1 year before symptoms appeared.

Case C. Age 50; maximum weight, 2 years before symptoms appeared.

Case D. Age 40; maximum weight. 6 months before symptoms appeared.

Case E. Age 36; maximum weight about time of appearance of symptoms.

Case F. Age 70; maximum weight, 4 years before symptoms appeared (fundus).

"Five other cases recorded show loss of weight from 4 to 6 years previous to the appearance of the disease, but these cases were between 60 and 70 years old, and were all diseases of the fundus uteri. Cases A and C above given, were inoperable cases."

The other histories received are:

Case 1. Age 51; maximum weight about 1 year ago.

Case 2. Age 35; maximum weight about 1 year ago.

Case 3. Age 54; maximum weight about 9 months ago.

Case 4. Age 46; maximum weight about 9 months ago. 190 pounds.

Case 5. Age 50; maximum weight about at present time.

Case 6. Age 52; lost weight during past year, but substantially the same for 5 years previous to that.

Case 7. Age 35: maximum weight attained about 2 years ago. Pregnant shortly afterwards.

Possibly, should you feel inclined to publish it, the above research might be of interest to other surgeons and gynecologists than those to whom I have written.

I would suggest the use of the following questions:

CLINICAL DATA OF CANCER OF UTERI

1. Present age?
2. About how long ago was maximum weight attained, and about how long did it continue?
3. About how long ago did pain, hæmorrhage, or discharge, appear?

E. ATLEE.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

FREDERIC A. BESLEY, M. D.

GEORGE E. BEILBY, M. D.	WM. R. CUBBINS, M. D.	AIMÉ PAUL HEINECK, M. D.
WM. C. DANFORTH, M. D.	FREDERICK G. DYAS, M. D.	G. T. COURTENAY, M. D.
FRED C. ZAPFFE, M. D.	JAMES F. CHURCHILL, M. D.	B. J. O'NEILL, M. D.
ARTHUR B. EUSTACE, M. D.	JOHN A. WOLFER, M. D.	H. A. POTTS, M. D.

The End Results of Operations for Inguinal Hernia, 172 Cases. CHANNING C. SIMMONS. *Boston Medical and Surgical Journal*, June 23, 1910.

The author divides the etiological factors into three groups: congenital, weak abdominal wall, and increased intra-abdominal pressure.

He draws the following conclusions as to treatment: first, palliative measures — advisable in infants and old people who are judged poor operative subjects. Best accomplished by a truss; second, operative measures as a rule advisable from three to fifty years; in all strangulated cases.

The results of the operation in the cases reported showed recurrences, as to operation, Bassini 7 per cent and Ferguson 10 per cent.

In one case upon which it was done McEwen's operation was successful, and Kocher's and Halsted's methods were each done twice successfully. Of the double hernias operated upon 18 per cent recovered. Suture material was apparently not a factor.

As to pathology, recurrent cases all showed an anatomical defect in inguinal muscles. An undescended testicle was found in ten per cent of the cases. Seventeen cases were strangulated. Post-operative complications developed as follows: Pneumonia, 4 cases, pleurisy, 1 case, bronchitis, 1 case, and sepsis 1 case.

Four patients died, in two cases of which strangulation had occurrred. GORDON COURTENAY.

The Clinical Significance of Gastric Hypersecretion and Its Connection with Latent Disease of the Appendix. W SOLTAU FENWICK. *Proceedings Royal Society of Medicine*, April, 1910, vol. iii, No. 6.

Of 112 consecutive cases of hypersecretion Fenwick found the sole disease in the gastro-intestinal tract to be located in the appendix in 22. He draws the following conclusions:

1. Chronic hypersecretion of the gastric juice is not a primary functional disorder of the stomach, but is invariably the result, possibly a reflex one, of organic disease of the stomach itself, or of some other organ of the body. In the great majority of cases it is found to be associated either with ulcer of the stomach or duodenum, gall-stones, or disease of the appendix; but it is probable that future investigations will show that pancreatic calculus, tubercle of the cæcum, and new growths of the appendix are also capable of producing it.

2. A continuous flow of a hyperacid gastric juice, whatever be its cause, always excites severe inflammation of the stomach, and is very liable to be followed by ulceration of that organ or the duodenum. This secondary ulceration is at first superficial in character, and may not be demonstrable on examination of the exterior of these viscera. Minute hæmorrhagic erosions, capable of producing hæmatemesis and melæna, are often associated with, and caused by, this abnormality of secretion.

3. There is an important connection between the condition of the appendix and the state of gastric secretion. When active irritation of the former exists, such as ensues from ulceration of its mucosa or the presence of a calculus, the gastric juice is usually increased both in quantity and acidity, and the patient exhibits the usual phenomena of hypersecretion. On the other hand, thickening, torsion, cystic dilatation, or adhesion of the appendix, which result from an attack of acute inflammation, are apt to be followed after a time by a peculiar type of chronic gastritis, attended by persistent flatulence, nausea, and anorexia, which the usual methods of treatment fail to allay. In this connection the contents of the stomach exhibit an excess of mucus, and are usually devoid of free hydrochloric acid.

4. With the exception of severe hæmorrhage, all the symptoms of chronic duodenal ulcer are due to the hypersecretion which accompanies it. The pain that ensues two or three hours after the ingestion of food is probably caused by contact of the sore with the hyperacid contents of the bowel. That the presence of chyme, or undigested food, is not essential to the production of pain is evidenced by the characteristic seizures that occur during the night, when the stomach is devoid of food, or after oral feeding has been suspended for several days. The constant immersion of the ulcer in a relatively strong solution of free hydro-

chloric acid is one of the chief obstacles to its healing. The so-called "hunger pain" is met with in all the dinical forms of hypersecretion, but since its severity varies with the degree of acidity, it is usually most pronounced in cases of ulcer of the stomach or duodenum.

5. Contrary to the general belief, a soft carcinoma of the pylorus is sometimes attended by severe hypersecretion. In such cases the morbid growth often develops with great rapidity, and violent hæmorrhages are apt to occur, possibly owing to digestion of the growth. In many instances the history affords no indication of previous simple ulcer.

C. G. GRULEE.

The Distinct Signs of Abdominal Cancer (Les signes à distance des cancers abdominaux). F. LEJARS. *Sem. Med.*, 1910, xxx, 340.

After calling attention to the lymphatic metastases in abdominal cancer, Lejars mentions two other physical signs of much importance. First of these, the prerectal induration, is caused by metastases in cul-de-sac of Douglas which arrives at this point either by extension along the peritoneum, by way of the blood or lymph. The second sign, one known for some time, but one which has been disregarded recently, is the induration of the umbilicus. Both of these are signs of an inoperable cancer. C. G. GRULEE.

The Operative Treatment of Tuberculosis of the Small and Large Intestines (Ein Beiträge zur operativ Behandlung der Tuberculose des Dünn- und Dickdarmes). RUDOLF RUBESCH. *Beiträge zur klinischen Chirurgie*, bd. 64.

Rubesch reports 35 cases of tubercular disease of the intestine, of which 31 are of tuberculosis of the cæcum or iliocæcal region. The operative procedures are summarized as follows:

TUBERCULAR ILEOCÆCAL TUMOR

1. Lateral anastomosis (Maisonneuve). This was done 13 times, 5 times between the ileum and transverse colon and 8 times between the ileum and ascending colon. In one case later resection was done. One case died (mortality 7.69 per cent). In 11 cases discharged cured the stenosis was relieved and in 10 of them permanently.

2. Entero-anastomosis with later resection done in one case. Anastomosis was made between ileum and transverse colon with Murphy button. Three weeks later the resection of the cæcum was done. Patient well after two years.

3. Bilateral isolation of the affected portion of gut. In one case where no fistula existed a side-to-side anastomosis of ileum and colon transversum was made, the cut ends of ileum and colon ascendens being brought to the surface, and the cæcum washed out with antiseptics for several months.

The tumor decreased in size and later resection was safely made.

In case having a fistula the side-to-side anastomosis was done, but the cut end closed. Death followed in a few hours.

4. Resection of ileum and cæcum and anastomosis at one sitting. Ten cases. In one case the cæcum alone was removed. In 9 the cæcum, together with portions of colon ascendens or ileum or both. Anastomosis in 7 cases was side-to-side and 3 times end-to-side. Permanent healing of above cases in 50 per cent.

CONCLUSIONS AS TO ABOVE PROCEDURES

1. The simple lateral anastomosis is, in cases of ileo cæcal tuberculosis which have progressed to the stage of tumor, only a palliative operation. As such it relieves the stenosis, but is slight in its influence over the lesion itself.

2. Resection should always be done where possible.

3. If the tumor is large and immovable, and the individual reduced, the entero-anastomosis is recommended.

4. If the tumor is large and immovable and the individual strong enough to stand a more severe procedure, the isolation of the affected gut by entero-anastomosis and the bringing to the surface of the cut ends, followed by resection at a later date, is recommended.

TUBERCULOSIS OF THE COLON, EXCLUSIVE OF CÆCUM AND RECTUM

One case in which a tumor of hen's egg size was extirpated from the region at the splenic flexure is noted.

MULTIPLE TUBERCULAR STRICTURES IN THE SMALL INTESTINE

Four cases. In one case 60 cm. above the ileocæcal valve were resected. Anastomosis by Murphy button.

In the 3 other cases entero-anastomosis was done.

Rubesch thinks that in all cases of tuberculosis of the small gut the operator should not content himself with entero-anastomosis alone. Wherever possible resection should be done. W. C. DANFORTH.

Œdema Following Operation for Pyloric Stenosis (Œdeme nach der Operation von Pylorusstenosen). DR. AMZA JIANU. *Wien. klin. Wchnhr.*, 1910, xxiii, 994.

Jianu reports two cases of œdema following operation for pyloric stenosis. In each case the œdema came four to five days after the operation. In the first the œdema was found in the leg, upper thigh, and prepuce; in the second case in the leg only. On examination of the urine he determined that a chlorin retention was present. He explains this in the following way:

Before the operation the patients were on a milk diet (chlorin poor); after the operation the patients were soon put upon a chlorin rich diet. He thinks that the œdema existed as a result of the retention of chlorin before the system had adjusted itself in such a way as to be able to excrete the increased amount of chlorin. This he proved by putting the patient again upon a milk diet, at which time the œdema disappeared and did not reappear upon resumption of the chlorin rich diet.

C. G. GRULEE.

Operation for Hypophysis (Zur Operation der Hypophyse). JOHANN FEIN. *Wien. klin. Wchnschr.*, 1910, xxiii, 1035.

Describes an operation on the hypophysis by traversing the antrum of Highmore. The first incision is through the mucous membrane of the gum, down to the periostium extending from the median line backward. Periostium is then lifted off the bone as far as the orbit, the nasal muscles held aside. The anterior and median wall of the antrum of Highmore removed. The ethmoid bone is then removed and posterior portion of septum. The hypophysis is then reached from below by opening the base of the sella turcica.

Fein claims that his operation gives more room for the removal of the hypophysis. C. G. GRULEE.

Bone Substitution; Contributions on the Subject of Transplantation of Dead Bone (Über Knochenersatz; Beiträge zur Transplantation toten Knochens). PROF. DR. W. KAUSCH. *Beiträge zur klinischen Chirurgie*, bd. 68, h. 3, p. 670.

According to Ollier, living bone with its periosteal covering will retain its vitality and unite, if transplanted in the same species, whereas, living bone of another species, or dead bone, while capable of being buried, will be absorbed and replaced by new bone. This theory was attacked by Barth, who claimed that all transplanted bone, living or dead, with or without periosteum, dies and is absorbed. Then came Axhausen, who proved the incorrectness of Barth's dictum, so that to-day it is generally accepted, that when fresh bone is transplanted, the periosteum retains its vitality, and forms new bone which replaces the bone transplanted. Lexer's work on the transplantation of whole joints is founded on this fact. The transplantation of dead bone has been generally abandoned.

The following methods for replacing bony defects are mentioned in their order of preference, viz.:

1. Pedunculated flap of soft parts, periosteum, and bone.
2. Freshly transplanted bone with its periosteum, from the same individual (autotransplantation).
3. Freshly transplanted bone with periosteum, from another individual (homotransplantation).
4. Fresh bone sterilized by boiling.
5. Fresh bone treated with preservatives.
6. Bone procured under aseptic precautions from a dead body.
7. The same as above, after boiling.

The above are used in cases where the bony defect or cavity is entirely destitute of periosteum. Where there is periosteum persisting, as after subperiosteal resection, the following may be used:

8. Ivory.
9. Metallic appliances.
10. Fresh bone of animals; bone either living or sterilized.

This whole subject of bone replacement was created by the practice of resecting, rather than amputating for sarcoma of the extremities. The rule was to resect in cases of myelogenous sarcoma, and for the periosteal type, to amputate. Mikulicz was the first to advise resection, which became very popular. Of late, the tendency again seems to be in favor of amputation, and opposed to the conservative operation.

Kausch reports nine cases as follows:

Case 1. Myelogenous sarcoma of the head of the tibia; total resection, including periosteum. Implantation of a piece of fresh boiled human bone. Healing, consolidation. Amputation on account of recurrence nine months later. New periosteum, and partial organization of the implanted bone and bony union.

Case 2. Pseudarthrosis tibiæ. Implantation of a fresh boiled phalanx. Healing; improvement of the pseudarthrosis; fistula formation and final removal of the phalanx.

Case 3. Myelogenous sarcoma of the head of the tibia. Resection. Implantation of a bone, freshly removed, but preserved for some time. Gangrene of the skin; removal of implanted bone.

Case 4. Myelogenous sarcoma of the humerus. Resection; implantation of ten inches of bone from a dead body. Removal after ten months on account of sinuses. Recurrence; amputation; death from metastases.

Case 5. Myelogenous sarcoma of the humerus. Resection; implantation of a fresh sterile bone from a dead body. Removal after one month on account of infection.

Case 6. Myelogenous sarcoma of the inner condyle of the femur. Resection implantation of a piece of sterile, macerated bone. Removal in eighteen days. Well after five years.

Case 7. Myelogenous sarcoma lower end of the femur; resection; implantation of a piece of sterile bone from a dead body; suppuration.

Case 8. Myelogenous sarcoma of the humerus; resection; substitution of a piece of metal; suppuration and removal. Recurrence; amputation. Well for seven years.

Case 9. Chondroma of the head of the humerus. Resection. Implantation of a piece of metal which was removed after ten weeks on account of suppuration. Well for seven years.

Case 1 represents the largest piece of dead bone ever successfully transplanted. It was over four inches long, became covered with newly formed periosteum, and united organically with the living bone. It proves, contrary to the prevailing opinion, that freshly prepared, but dead human bone can be successfully implanted into defects devoid of periosteum. In such cases, bone from cadavers, or metallic appliances are of no use. The paper is illustrated with many drawings and radiograms, and represents the latest knowledge on the important subject of bone transplantation.

WILLIAM HESSERT.

Non-Tubercular Renal Infections. E. L. KEYES, JR. *Boston Medical and Surgical Journal*, vol. clxii, No. 10.

The author takes up that class of cases not tubercular and not depending on the presence of stone or retention. He classifies them as: 1. Pyelitis — characterized by a simple bacteriuria and no subjective symptoms. 2. Pyelonephritis — where there is present

a considerable amount of pus and urine but no subjective symptoms. 3. Bacterial nephritis — frequently severe septic symptoms with bacteria-pus; often blood in the urine; kidney often shows multiple abscesses. There is frequently pain in the lumbar region. 4. Pyonephrosis — a retention affair and not discussed.

As to etiology, the author states that most of the infections are caused by the colon bacillus gaining admission to the general circulation from the gastro-intestinal tract. There must be some condition present to lower the resistance of the kidney. That may be a tubercular process, trauma, congestion, pregnancy, and the like.

Under diagnosis the author makes a strong plea for the use of the cystoscope and uretral catheter, with functional tests for the kidneys. He says that every case of bacteriuria should be considered renal until proven otherwise. The kidney should be X-rayed for a possible stone. The urine contains bacteria, usually pus, often blood, rarely casts; always albumen and is frequently acid reaction. There may be paroxysms of pus due to temporary anuria or retention.

He describes in detail his technique for urethral catheterization, functional tests.

Treatment: He uses urinary dilution and urotropin. The question of renal lavage and vaccine treatment are in his experience, still unreliable. He says to operate when there are intense septic symptoms with repeated chills. One should make sure of the condition of the other kidney. In conclusion he says: "The great majority of cases of acute surgical nephritis do not, however, demand the knife. Under rest, catharsis and diuresis with urotropin up to the limit, they usually subside. . . . ." J. A. WOLFER.

Appendicular Gastralgia, or the Appendix as a Cause of Gastric Symptoms. HERBERT J. PATTERSON. *Proceedings Royal Society of Medicine*, April, 1910, vol. iii, No. 6.

Dr. Patterson reports fifteen cases, of these diagnosed seven. Two with marked relief of a condition of hypersecretion, and in two hæmatemesis. In four the operation was unsuccessful. After taking up the conditions in detail, he mentions the various findings in the appendix, that especially frequent being bulbous at the tip with constriction at the base.

He notes also the very frequent occurrence of hæmorrhage of the mucous membrane of the stomach in these cases.

In differential diagnosis the chief conditions are those of duodenal ulcer, gastric ulcer, and gall-stones.

CONCLUSIONS

1. Appendicular disease may give rise to symptoms which closely mimic the supposed symptoms of gastric and duodenal ulcer.

2. The prominent symptom is epigastric pain or severe discomfort after food; in many cases there are sour eructations, vomiting, and even hæmatemesis and melæna.

3. The radiation of epigastric pain to the lower abdomen is very suggestive of appendicular trouble.

4. Gastric analysis reveals in some cases hyperchlorhydria, in others a normal amount of free HCl, in others a marked diminution or absence of free HCl. As a rule there is an increase of the volatile acids, and, in some cases evidence of hypersecretion.

5. Some cases of hypersecretion or acid dyspepsia, and many cases of supposed gastric or duodenal ulcer, are cases of latent appendicular disease.

6. The evidence that the gastric symptoms are due to appendicular disease are threefold: *a*, The majority of the patients are cured by appendicectomy; *b*, the influence which appendicectomy has on the gastric contents; *c*, the frequency of a previous history of gastric symptoms in those who have an attack of acute appendicitis.

7. The symptoms are probably the result of intestinal toxæmia due to intestinal stasis. The effect on gastric secretion is, in the early stages, possibly due to pyloric spasm, but more probably to some influence of the appendix on gastric secretion.

8. Appendicular gastralgia is apparently more common in women than in men.

9. The important lessons to be learned from these cases are: (1) That no operation should be performed on the stomach when a definite organic lesion of the stomach or duodenum exists. Gastrojejunostomy will not cure appendicitis. (2) That in all operations for supposed gastric or duodenal ulcer the condition of the appendix should be carefully investigated.

C. G. GRULEE.

The Indications for Pyloric Exclusion (Die Indicationen der Pylorus Ausschaltung). AMZA JIANU. *Wein. klin. Wchnschr.*, 1910, xxiii, 1223.

Jianu discusses its advantages with report of two cases of gastric ulcer. Operation after the method of Jonesco. Ligature of coronary and gastroepiploic arteries, clamping, section of stomach, closure of both ends, posterior retrocolic gastro-enterostomy. Pyloric exclusion represented as radical operation while simple gastro-enterostomy is but palliative. Hæmorrhages rarely cease after gastro-enterostomy.

Peptic ulcer of the jejunum occurring especially in cases of pyloric stenosis with hyperchlorhydria will be prevented by pyloric exclusion. Position of stomach vertical during contractions; stomach of gastro-enterostomy drawn laterally, hence easier egress of gastric contents through pyloric orifice. Simple gastro-enterostomy should be reserved for advanced cases of pyloric stenosis where state of patient, extent of lesions and adhesions do not permit a resection or exclusion. Exclusion is especially indicated where the ulcer is in the state of evolution. Exclusion is almost always indicated in duodenal ulcer, as resection is impossible in most cases. C. G. GRULEE.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. Bacon, M. D. — Herbert Marion Stowe, M. D.
Heliodor Schiller, M. D. — C. G. Grulee, M. D.

About Decidua Cells and Their Function (Über Deciduazellen und ihre Bedeutung). Dr. F. Ritter. *Beitr. z. Geb. und Gyn.*, b. xv, h. 2.

At the height of the development of the decidua — this is in the second month of pregnancy — the mucosa of the uterus shows a picture very similar to certain ductless glands, for instance, the cortex of the glandula suprarenalis. At the end of the third month the decidua cells begin to show involution, and in the mature placenta there are only remnants of them present. The process of involution is partly by necrosis, partly by metamorphosis into the original stroma cells —spindle cells. In the rabbits the cells analogous to decidua cells are called glycogen cells (they contain a great amount of glycogen). About the eleventh day (involution) these cells show involution, necrosis, or solution, and toward the middle of pregnancy no glycogen can be detected any more. Cells analogous to decidua cells in rats and mice also contain glycogen. The decidua cells in the human and the glycogen cells in rabbits and rats have among other things one common point — the height of their formation falls at the beginning of the development of the placenta fœtalis, at the time of the establishment of placental circulation.

All species which form a placenta form decidua cells; and while there are wide differences between the decidua cells of different species, to all is common: 1. Their extraction from the stroma of the uterus. 2. The uniform formation of the nucleus of the cells, first followed by the formation of the protoplasma of these large cells. 3. Their later involution by necrosis or metamorphosis. 4. Last, but not least, the height of development of these cells in all species falls before establishment of the placental circulation.

This last fact especially — the beginning of the involution of these cells with the formation of the placenta — points strongly to the function of these cells as a nutritious organ for the fœtus whose vitelline has long been consumed. The maternal blood around the ovum (the amount of which varies so often) and the so-called uterine milk, which are absorbed by the chorionic epithelial cells, will not be sufficient to furnish nourishment. The deficiency is made up by the decidua cells. They furnish to the growing ovum carbohydrates in the form of glycogen. The source of the glycogen is the maternal blood. Erythrocytes are often found inside the glycogen cells. In the decidua cells of the human no glycogen has been found. Here we will have to suppose that the protoplasma of the cell is directly transformed into soluble carbohydrates without glycogen in an intermediate stage. The liver of embryos lacks glycogen. This missing function of the liver is made up by the glycogen in the placenta. The idea that the decidua acts only as a cover, a protection, for the ovum, is wrong. The decidua cells furnish the carbohydrates for the growing ovum. The decidua belongs to the glands with an internal secretion.

Heliodor Schiller.

The Care of the Breasts during the Puerperium. H. E. Lindeman. *Bulletin of the New York Lying-in Hospital*, 1910, vol. vi, 127.

Lindeman reports on the results of the Williams' method in a series of one hundred cases. This method is characterized by the omission of breast binders in ordinary cases and the use of loose supporting binders in patients with large or flabby breasts. Half grain doses of codeine are given if the breast becomes painful, and no particular attention is paid to the bowels or the diet. The fluids are not restricted nor are the patients purged. The chief results of this method of treatment were excellent; it proved more comfortable for the patients and required less attention from the nurses.

C. G. Grulee.

Morbid Anatomy of the Toxæmia of Pregnancy. J. E. Welch. *Bulletin of the New York Lying-in Hospital*, 1910, vi, 131.

Welch reports on a series of sixteen cases in which post-mortem examinations were made, and in which a number of interesting points are brought out. In addition to diffuse hæmorrhage in various parts of the body, a marked hæmolysis is usually found. About 50 per cent of the eclamptic sera will destroy more or less of the red cells of the normal individual, just as often as the sera of the normal individual destroys the red cells of eclamptics. It was also found that the injection of 150 cc. of eclamptic serum obtained by venesection from a patient who had had his twentieth convulsion, did not produce any disturbance whatever when injected subcutaneously into the normal human subject. Welch states that the hæmorrhages may often be explained by the processes of thrombosis and embolism. In addition to these, another cause is the solution of the lining endothelium of the capillaries and small blood-vessels, which produces a weakness of their walls.

Increased blood pressure is also a factor in increasing the extensive hæmorrhage which may occur from the causes mentioned. Welch did not find any lesions in the fœtus which corresponded to those in the adult. As far as he could judge from a microscopical examination of the thyroids, their structure was quite normal.

C. G. GRULEE.

One Hundred and Thirty-three Cases of Hydramnios. EDWARD BURSTAL. *Practitioner*, lxxxv, 112. 1910.

Burstal reports the cases occurring in the Queen Charlotte's Hospital from 1900 to 1905 inclusive, 54 out of the total of 8,198, and from York Road Lying-in Hospital, 1894 to 1904, 79 out of the total of 5,759. From his observations he draws these conclusions:

1. The percentage of women with hydramnios varied from .65 at Queen Charlotte's Hospital to 1.3 at York Road Lying-in Hospital. I am unable to offer an explanation for this variation.

2. The total number of cases at the two hospitals was 133, out of which 6 were twin pregnancies.

3. The sexes were distributed in a different way to what is usually given in the text-books, 74 being male and 61 female.

4. Monsters and deformities were rare. Two were anencephalic, one was hydrocephalic with double harelip, spina bifida, and talipes, and one had harelip and cleft palate, i. e., four deformities out of 139 children born.

5. The effect of the excess of liquor amnii on the second stage of labor was not marked, the average duration being about one and one-half hours.

6. The excess of liquor amnii seemed to predispose to postpartum hæmorrhage, it being recorded in 19 cases.

7. The presentation was vertex in 122 cases, breech in 13 cases, face in 2, and transverse in 1. The excess of fluid does not seem to predispose to abnormal presentations.

8. The age of the mother cannot be considered a predisposing cause of hydramnios, the ages varying from eighteen to forty-six, nor can the number of the pregnancy, as hydramnios occurred in pregnancies varying from the first to the fifteenth.

9. In no single case was there a history of hydramnios.

10. Albumen was present in the urine of the mother in forty-six out of one hundred and twelve recorded cases.

11. With regard to the twin cases no definite statement can be made.

C. G. GRULEE.

Manual Removal of the Mature Placenta (Entfernung der reife Nachgeburt). ARNOLD LEO. *Beiträge zur Geburtshilfe und Gynäkologie*, bd. xv, h. 1.

Manual removal of the placenta at term becomes a rare necessity when the third stage of labor is properly conducted. Normally, the uterine contractions, accompanied by more or less hæmorrhage, separate the placenta, while abdominal pressure, contraction of the vaginal muscles, and gravity assist in its expulsion. Crede's expression hastens the process materially but should only be attempted after complete separation. Generally, this takes place in from 15 to 30 minutes. Separation of the placenta is recognized by the well known signs plus Strassmann's observation (compression of the fundus causes an overdistension of the funic vessels when the cord is clamped and the placenta is adherent).

This treatment is ideal in normal cases, but is injudicious when a dangerous hæmorrhage occurs before complete placental separation, when the detachment is unduly delayed, or when, despite the evidences of separation, Crede's expressions prove negative.

In the event of serious bleeding, it is well to secure hæmostasis, if possible, by circular fundal massage and hot vaginal irrigation, and then to await spontaneous separation. If this treatment is inefficacious, Crede's expressions are indicated; still, one sees little benefit from these early and forced maneuvers. Frequently the placenta is torn and but partially separated and the condition necessitates a manual removal later on. Crede's expressions may be repeated but only at intervals of from 15 to 30 minutes. If the result is negative under anæsthesia, manual removal is indicated.

If the placenta is completely adherent, no hæmorrhage takes place and one may with safety wait for spontaneous detachment for three hours. Further expectancy is not advisable. At this time, the expression is repeated under narcosis and if negative, the placenta is to be removed manually.

In the presence of continuous bleeding from the placental site and increasing anæmia of the patient, one should not delay effectual treatment. Remove the placenta before the patient becomes so depleted that she will suffer materially from the loss of blood. Air embolism following manual removal is rarely observed. The principal danger of the operation lies in the inoculation of the placental site with pathogenic bacteria from the vulva, vagina, or cervix. Therefore, a careful disinfection of the external genitalia is always a necessary precaution. The vagina is quickly irrigated and the cervix is brought down to the pelvic outlet either by pressure on the fundus or traction with volsella. Sterile gloves are always to be used. (The German operators are tardily recognizing the American surgeons' recommendations concerning the value of sterile rubber gloves.) Under anæsthesia, the placenta is separated carefully from the uterine wall and removed. The gloved hand is then rinsed in an antiseptic solution and the uterus is re-entered for further exploration and the removal of placental or decidual fragments still retained. The uterine cavity is finally irrigated with a hot solution.

Leo observed a relatively common cause of adherent placenta to be its implantation in one or both cornua. This occurred in 66 out of 329 cases. In this situation, the villi are deeply embedded in the uterine musculature. During the third stage, uterine contractions are weakest and least efficient at this point, and consequently, normal placental separation is at times impossible.

HERBERT M. STOWE.

Contribution to Placental Congenital Tuberculosis (Beiträge zur placentaren und congenitalen Tuberculose). DR. LEUENBERGER. *Beitr. z. Geb. u. Gynäk.*, b. xv, h. 3.

A woman, 29 years old, pregnant in the 9th month, fell suddenly sick with high fever followed by headache, coma, and exitus. The clinical diagnosis was tuberculous meningitis, miliary tuberculosis. The post-mortem confirmed this diagnosis, finding besides a tuberculous cystitis, ureteritis and pyelitis. The placenta, the membranes, cord and fœtus seemed macroscopically normal. The microscopical examination of the organs of the fœtus showed in sections of the liver typical bacilli tuberculosis in the capillaries, but no tubercular granulation tissue. Microscopically the membranes and the cord were found normal, but nearly all sections of the placenta were full of tubercular lesions, typical tubercles right on top of the villi in the intervillous spaces. But all the tubercles seemed to give the impression of being smaller in size than the tubercles found in the maternal organs. Some of the tubercles included a chorionic cell. On villi which were entirely surrounded by tubercular granulation tissue, the epithelial covering was destroyed, the tubercular tissue lying directly upon the stroma of the villus. In some of the villi the stroma showed hyaline degeneration, the blood vessels were distinct and the endothelial cells showed a tendency to multiply. In a few instances tubercles could be found inside the villi. In some sections tuberculous bacilli were found in the lumen of the placental vein. The basal decidua was found perfectly normal.

Animal experiments: A small piece of fœtal liver was implanted into the peritoneal cavity of a guinea pig; a second received in the peritoneum, one c.cm. of blood from the right auricle of the heart of the fœtus. After several weeks both pigs were killed and the post-mortem section showed miliary tuberculosis.

Very striking in this case was the great number of miliary tubercles found in all sections from the placenta. Their distinct smallness is caused first by the more intense reacting power of the placenta upon the same strain; second, by the fact that in the maternal organism the endothelial cells of the blood vessels take part in the formation of the tubercle, while the bacilli tuberculosis in the placenta are thrown in spaces covered with epithelial cells,— the epithelium of the villi which does not take part in the formation of the tubercles.

A woman of 32 years with advanced tuberculosis had a miscarriage in the sixth month and died soon after. The placenta and the fœtus seemed macroscopically free of pathological processes with the exception of some infarcts in the placenta. The guinea pig which was inoculated with the liver of the fœtus, remained normal, while the second pig which received 1 c.cm. of blood from the fœtus showed miliary tuberculosis in both lungs. Five hundred and thirty sections of the placenta were made and closely examined. None of these sections showed tubercular tissue, but many showed tubercular bacilli in the intervillous spaces especially around the infarcts. Most striking was the very marked stasis which could be seen in many capillaries of the villi; often diapedesis of the erythrocytes into the stroma of the villa could be seen, but far more often direct extravasation of blood into the intervillous spaces — extravasation partly by rhesis, partly by diapedesis. Capillaries overfilled with blood or already ruptured could be seen. In places of highest tension there was nothing left of the septum between fœtal and maternal blood but a very thin membrane as a remnant of the syncytium. However, in more than 100 sections no tubercular granulation tissue could be found, but after many months of close study there was found one bacillus tuberculosis in the intervillous space right next to one of the ruptured capillaries of a chorionic villus, and in a second section there were found two bacilli tuberculosis in the above described thin membrane between maternal and fœtal blood. In a third section there was found a bacillus tuberculosis in the lumen of a capillary of a chorionic villus.

The author thinks these three findings strong enough to form a picture of the infection of the fœtal blood with bacilli tuberculosis.

1. The transmigration of a tubercular bacillus of the intervillous space into the ruptured capillaries of the villus is unquestionable.

2. The diapedesis of erythrocytes into the intervillous space opens an avenue for bacilli tuberculosis to enter the capillaries of the chorionic villi, the dehiscence of the erythrocytes now being used by the bacilli tuberculosis, the direction of both naturally being opposite to each other. A higher pressure in the intervillous spaces than in the capillaries of the villi would favor this mode of invasion, and indeed, this difference of pressure exists during the second stage of labor, the placenta being under higher pressure than the descended fœtus.

With our knowledge that tuberculosis bacilli are found in the blood of even chronic cases of tuberculosis, the way of infection of the fœtal blood seems now clear. This theoretical and practical consideration leads also to the clinically important advice in cases of suspicious or existing tuberculosis of the mother to cut the cord immediately after delivery, since in the moment of the establishment of the pulmonary circulation the pressure in the new born and placenta differs greatly.

HELIODOR SCHILLER.

Varix Bleeding in Pregnancy (Varix Blutung in der Schwangerschaft). R. CRISTOFOLETTI. *Gynakologische Rundschau*, bd. 4, h. 7.

Dilatation of the veins in the lower portion of the body and especially in the external genitalia, vagina, and pelvic viscera is relatively common in pregnancy. They occur in nearly two-thirds of all cases and are more frequent in multiparæ. They increase in size as pregnancy advances and recede during the puerperium. The theory that varicosities are due to the pressure of the pregnant uterus on the pelvic veins is not tenable. Schauta has shown that they occur before the uterus is large enough to cause pressure and also that in many instances of large abdominal tumors, varicosities are absent. Fischer claimed that the elastic fibers of the vessel wall were disturbed by inflammatory

infiltration and consequently yielded to increased blood pressure. This influence was believed to be due to toxic changes. Some other factor than toxæmia must be active, as toxæmia is more common in primiparæ, while varicosities increase with the number of pregnancies.

It is admitted that enlargement of the veins during pregnancy is a physiological phenomenon. The uterine sinuses and broad ligament vessels are always enlarged, and during the puerperium they normally return to their former condition. In the great majority of cases they give rise to no disturbance, yet one reads in the literature of many women dying from rupture of these varices during pregnancy or labor. As the valves of the dilated veins are unable to functionate properly, it is easy to see that pressure from the common iliac is freely communicated to the peripheral veins and a serious or fatal bleeding may follow. One must distinguish between rupture during pregnancy and during labor. In the first instance, the dilatation and communicated blood pressure is permanent until labor comes on, while in the second instance, emptying of the uterus is followed by a rapid recovery of the vessel wall.

The mortality in ruptured varices is great. In pregnancy, the cause is either coitus or scratching; during labor, the pressure of the fœtal head. Occasionally no cause is discovered. In 18 cases collected by Budin and Wüllner, 16 died.

The symptoms are various. If the varices are large and located in the vagina, subjective disturbances may be absent. At other times, the patient complains of itching and burning or slight pain. If the tumor mass is large and protrudes from the vulva, there is difficulty in walking and sitting. Thrombosis may complicate the condition during pregnancy. The thrombi may be palpable as knots of various sizes. They should be differentiated from the primary and secondary knots of chorio-epithelioma. Hæmorrhage occurs when an embolic necrosis takes place in the convex surface of the varix. When this is expelled, an aperture is left that resembles a punched out perforation. The edges are sharp and clean, and differ markedly from the malignant condition. Bleeding may also occur in a thrombosed varix after infection. Such a varix shows a perforation with irregular thick walls and resembles an ulcer.

If a varix ruptures during pregnancy, the treatment is to arrest the bleeding and by prophylactic measures prevent its recurrence. If it is impossible to ligate the vessels, the hæmorrhage must be controlled by a tampon. Experience teaches, however, that the removal of the gauze renews the bleeding, while if the tampon is allowed to remain for a long time, the danger of sepsis is increased. For these reasons it is unwise to procrastinate until the woman becomes anæmic or infected, and Cristofoletti prefers to induce labor by the bougie method. If the varicose condition in the vagina is pronounced, delivery per vias naturalas will be accompanied by serious hæmorrhage and laceration of tissue, and may prove fatal to the patient. In such cases, abdominal delivery is recommended.

In a case reported by the author, the woman had bled profusely. Her vagina was small and filled with varicose enlargements. An attempted examination by the finger and speculum resulted in severe bleeding. A tampon was inserted at once. Forty-eight hours later, it was removed and hæmorrhage commenced immediately. The child was delivered by Cæsarean section and the uterus removed. The veins in the broad ligaments were greatly distended. The mother made a good recovery. HERBERT M. STOWE.

Chloride Intoxication and Eclampsia (Chloruration et éclampsie). LE PLAY. *Sem. Med.*, 1910, xxx, 361.

Le Play gave a diet rich in chlorides to eight pregnant nephritics and two eclamptics. In no one of the nephritics did œdema develop nor did the amount of albumen in the urine increase. No signs of intoxication developed and the patients gained in weight from a kilo to a kilo and a half. The two cases of eclampsia were given a chloride rich diet about ten days after delivery and showed no interruption in their recovery. He concluded that the chloride excreting function of the kidney is a special one and that its disturbance is not the cause of eclampsia, but at times may result from this disease. C. G. GRULEE.

Vulvo-Vaginal Hæmatoma (Zur Kenntnis des Hæmatoma Vulve-vaginale). DR. J. REICH. *Wien. klin. Wchnschr.* 1910, xxiii, 1060.

Reich reports one case of vaginal and two of vulvo-vaginal hæmatoma. Hæmorrhage may occur either above or below the pelvic fascia. The vulvar type is the most rare and is probably the result in many cases of atheroma of the blood vessels. This type occurs nearly always during labor. The narrow pelvis is another predisposal factor. Many of these cases are overlooked and an infection which may be fatal is a frequent complication. The vulvo-vaginal hæmatoma may occur during labor or during pregnancy. The trauma which causes this hæmorrhage is often an indirect one. This hæmatoma may also occur when there is no pregnancy present and is then usually due to direct trauma of one sort or another. C. G. GRULEE.

BOOK REVIEWS

KLINISCHE UND ANATOMISCHE BEITRÄGE ZUR LEHRE VON UTERUSMYOM. By Dr. Med. Anton Garkisch, First Assistant in Clinic of Prof. Kleinhans, Deutsche Universität in Prague. Berlin: S. Karger, 1910.

The author divides his text in two parts — clinical and histological.

The materials from which he draws his conclusions and reports are those cases which were attended in the clinics of Professors Kleinhans and Von Franqué. In all 601 cases of uterine myomata from a total of 16,929 female patients, 54.8 per cent occurring between the ages of 40 to 50. He makes the statement that myomata do not necessarily stop growing at the menopause, and that they may cause a delay of the menopause so late as to the 50th or 55th year or even later.

As to the location of the tumor, he tabulates as follows:

94.2 per cent in fundus, 4.5 per cent in cervix, 1 per cent in portio, 23.2 per cent subserous, 44 per cent interstitial, 16.2 per cent submucous, 14.2 per cent combined.

Under symptoms he gives an interesting discourse on the hæmorrhage and pain in relation to the tumor and its degeneration, either benign or malignant.

In the chapter on cardiovascular complications he states that in his opinion most of the heart murmurs are due to the anæmia following prolonged hæmorrhages, and that the glycosuria may be caused by pressure on the pancreas.

In the part "Myomata and Uterine Carcinoma" he clearly points out that with myomata there is an increased percentage of carcinoma of the fundus in contrast to pure carcinoma where the condition is infrequent, the majority appearing in the cervix. The diagnosis is rarely made except by a microscopic examination of the uterine scrapings. The diagnosis of sarcomatous degeneration is made only post-operative. Neither have a diagnostic symptomatology.

He gives the following indications for abdominal operation, preferring the supravaginal hysterectomy in all except 4.

1. Cervix myoma. 2. Suggestion of malignant degeneration. 3. Intraligamentous tumor. 4. Malignant tumor of the cervix. 5. When combined with an inflammatory condition of the adnexa.

The conservative abdominal operation is indicated only in patients under 40 years of age, who have a strong desire for procreation and have the subserous type, or solitary interstitial tumor not so large as to open into the uterine cavity.

The vaginal hysterectomy should be used when the tumor is not too large, and when the uterus can be pulled down. He gives the following contraindication to this operation: 1. Malignancy or inflammatory change in adnexa. 2. Adhesions. 3. Large tumors.

The currettement will often improve conditions in the submucous variety.

He gives an interesting tabulation of the anæsthetics with their complications.

In all the cases he attempted to get a post-operative history as to: Abdominal wound, future menstrual history, ability to do work, general health, and pelvic findings.

Part Two. Histological. He reports 169 cases, giving in each a brief clinical history, the operation and anæsthetic used, post-operative complications if any, later examination, and pathological examination of the specimen.

In general he finds hypertrophy of the endometrium in one-half of the cases of subserous myoma; in one-third of the interstitial types and in one-fifth of the submucous variety. Round-cell infiltration in one fifth of the subserous, a little more frequent in the interstitial, and rare in the submucous variety.

As a closing statement he says that there are no definite changes in the endometrium but that the ovaries show changes in the majority of cases. Many of the tumors undergo hyaline changes.

He closes the article by reporting eleven cases, in detail the pathology of the tumor, uterus, and adnexa.

J. A. WOLFER.

GENERAL SURGERY. Volume II, The Practical Medicine Series. Edited by John B. Murphy, A. M., M. D., LL. D. Chicago: The Year Book Publishers, 1910.

The second volume (dealing with general surgery) of the Practical Medicine Series for the year 1910, is an excellent résumé of the late advances in this branch of medicine. The entire series published so far during the current year as well as the present volume, should give the editors of the series much personal satisfaction, as they have, without exception, been most excellent compilations from current literature. They can be recommended unreservedly as a true mirror of surgical and medical progress.

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Fig. 1. Fleshy button covering perforating ulcer of the lesser curvature.

Fig. 2. Three forms or degrees of ulceration running along the lesser curvature. To the right, deep perforating ulcer. To the left, a mucous or superficial ulcer. Between the two may be seen a small deep ulcer with an open vessel plugged with a clot.